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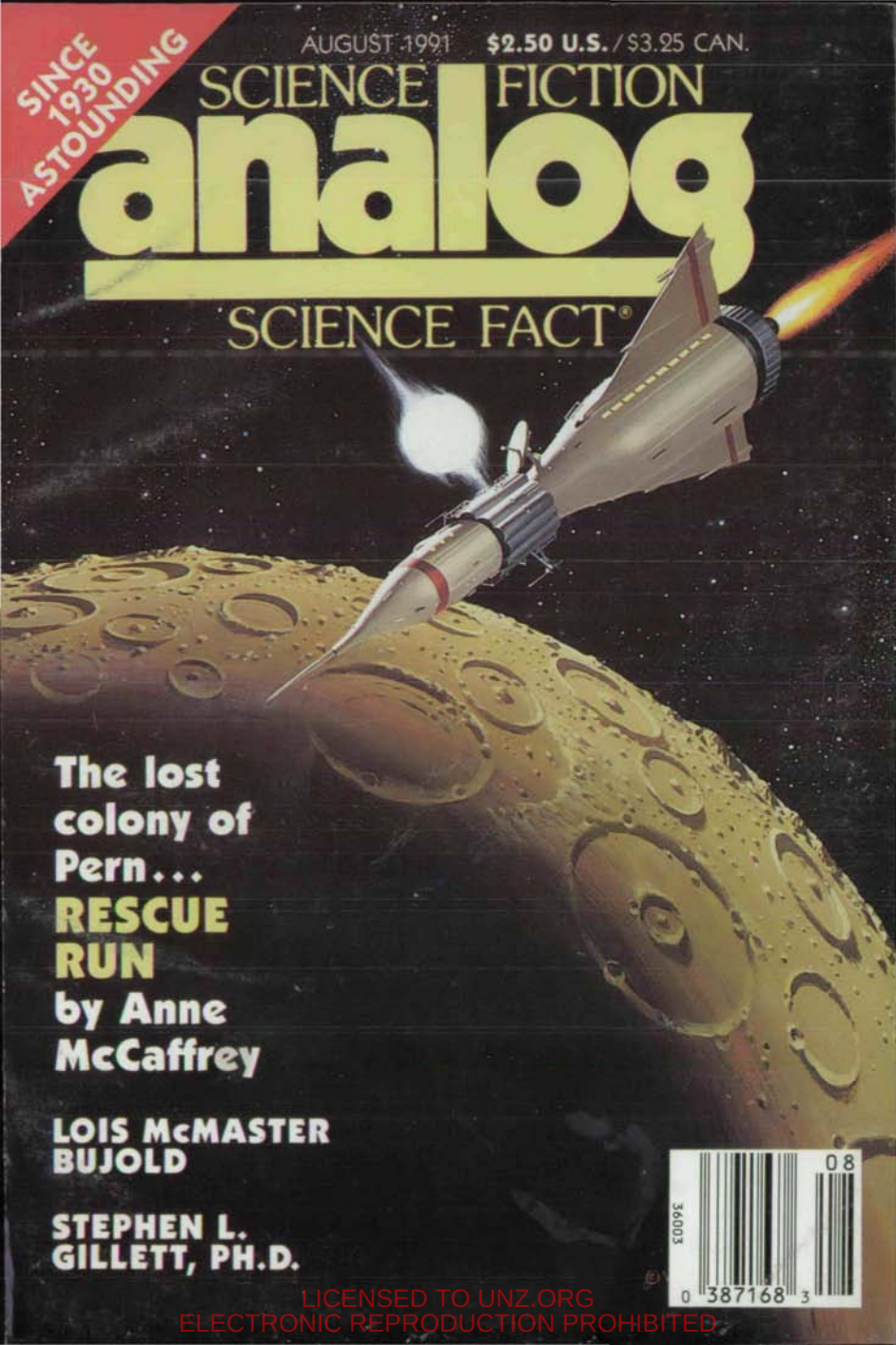

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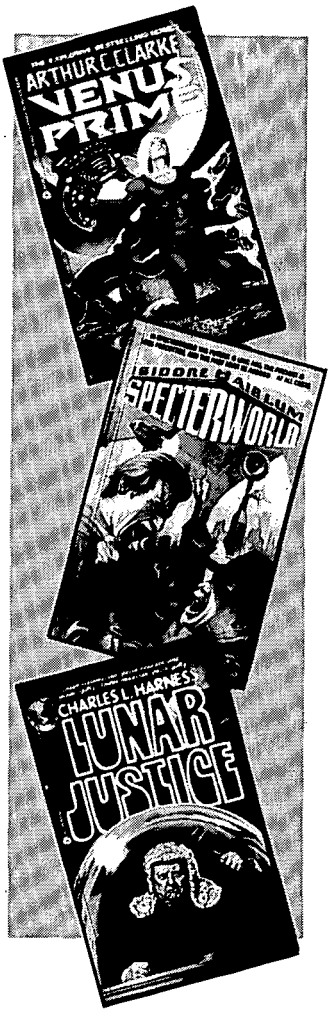

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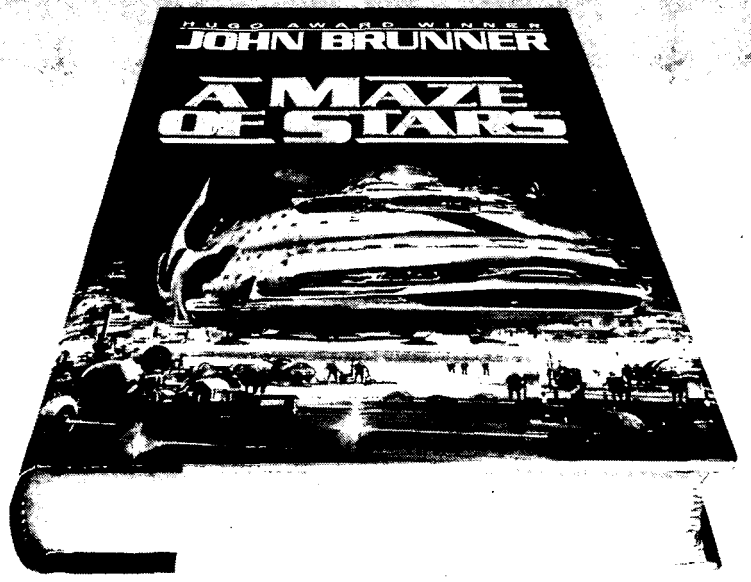

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Editorial

CONTINUITY

Stanley Schmidt

Alfred Korzybski, the originator of general semantics, described man as the "time-binding" animal — the one that transmits knowledge from generation to generation. Other animals do this, too, of course, but in a much more limited way. Cats teach kittens to hunt, for example, but only their own kittens (the *next* generation) and only by direct demonstration. Surely one of the most impressive and worthwhile accomplishments of *Homo sapiens* is the ability of its members to communicate with others whom they not only have never met, but who won't even be born until many generations after the communicator's death. We have records left by people who died literally thousands of years ago, which can be read with relative ease by sizable numbers of people living today.

Yet, ironically, we also have records created less than one generation ago, often by people still living, which have already become, for practical purposes, unreadable and inaccessible. That rather startling fact is a direct consequence of rapid improvement in ways of storing and handling information. Not because it *has* to be, but because of a side effect which (not surprisingly) people didn't think enough about soon enough. They *have* started thinking about it now, so there's hope that it won't be as much of a problem with present and future records as it is with those of the recent past—but only if people keep in mind that it can be.

Recognizable pictures on cave walls

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tell us something about human life in prehistoric times. Writing, depending on how you define it, started on the order of 5,000 years ago—but some of the earliest examples can still be read. Carved stone and clay tablets are very durable, and reading them requires nothing except a knowledge of the language in which they are written. Some of that knowledge, of course, has been lost, at least temporarily. Modern scholars couldn't read Egyptian hieroglyphics until they found the Rosetta stone; at least one Cretan and a few other early writing systems are still waiting for their counterpart. But anyone who wants to take the trouble to learn how can read ancient Egyptian, Greek, Roman, Hebrew, or Chinese documents.

More recent languages are even easier. Shakespeare died almost 400 years ago, but any contemporary English speaker can get at least the gist of his plays, though their full depth and subtlety may require a little extra effort to look up unfamiliar words and usages. I don't even need that to read the diaries and letters of my great-grandparents; all I need is my eyes, my brain, and a knowledge of essentially contemporary English or German.

The problem with our snazzy, new, improved methods of storing information is that they *cannot* be used without complicated, expensive technological aids (though they're a lot less expensive than they used to be). I must emphasize that they really are, in many respects, great improvements. Word processors, for example, make writing, rewriting, and editing easier by orders of magnitude. Relational databases do the same for storing and systematically searching and retrieving large quantities of information, with the added advantage that they store it much more compactly than books or index cards. The advantages of such software are so great that anyone who has learned to use a word processor or relational database is likely to groan very loudly at the thought of using a typewriter or doing a manual literature search.

The disadvantage of computer records, of course, is that using them requires computers. A novel or a library catalog stored only on disk is extremely useful when the appropriate computer is available and operational—and utterly useless when it isn't. And that means not just any computer, but a particular combination of hardware and software compatible with the format used to store the data. That hardware and software, in turn, is useless without the technological infrastructure, such as a working power supply, to support it.

All of which is one reason why computer users still keep multiple copies, and hard copies*, of things really important to them. An operator error or a malfunction of either machine or power grid can instantly wipe out huge quantities of data. A widespread problem like a large electromagnetic pulse from a bomb blast can do that to all electronic

*Hard copies, by the way, are not really equivalent to, or entirely satisfactory substitutes for, electronic records. A printed copy of a novel is *nearly* equivalent to a disk copy, if all you want to do is read it—but not if you want to revise it. And a printed list of the contents of a database or hypertext system is a very feeble imitation of its electronic counterpart, lacking all the capabilities for fast searching and manipulation that make the electronic form so useful.

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copies in a wide area. Destruction of a nation's power network by war or natural disaster can make even surviving copies unusable, temporarily or in some cases permanently.

But there's another reason for keeping backups in multiple forms, a danger less dramatic but more insidious and much more likely to hit more people at the personal level. That is the simple matter of obsolescence, which these days happens very fast. Computer storage and handling of data has huge advantages which have made it common practice, and have also spurred an ongoing effort to make systems which are even better. The computers of today are vastly faster and more powerful than those of a few years ago, and those of tomorrow will be even more so. And therein lies the rub: data stored by the computers of one period may not be compatible with those of a later one.

A recent Associated Press story, headlined "Some of America's History is Lost in the Computer Revolution,"

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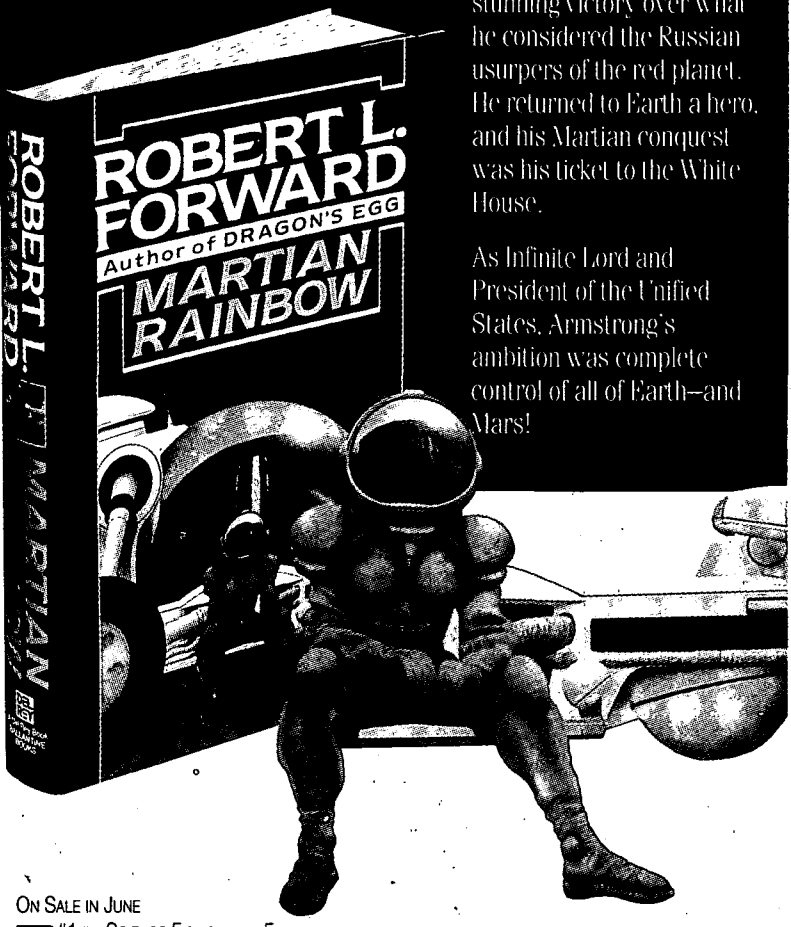

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cited some of the problems this fact is causing at the National Archives. Put simply, the Archives now contain a rapidly growing number of records which can no longer be read because they exist only in formats intended to be read by machines which are no longer built or maintained. Stacks of punch cards, for example, do you no good if your last card reader was worn out and thrown away years ago, and all you have now are various sorts of magnetic disk drives.

In principle, of course, the data are still there. You could retrieve them by building new card readers, or even by having human beings laboriously go over the cards, manually deciphering them and writing out what they say or typing it onto disks. But the sheer quantity of data stored, and the kind of value most of them have, will make such solutions economically impractical in most cases. And the older the data get, the less likely it is that anyone will be willing or able to bother.

With the time-honored stimulus of hindsight—seeing what troubles former practices have caused—designers of computer hardware and software have begun to anticipate and attempt to alleviate this problem. They increasingly provide ways to make it easier for information prepared by one combination of hardware and software to be used by another. For example, ASCII (the American Standard Code for Information Exchange) has become a widely used *lingua franca* that lets a document prepared with one word processor be moved as "text only" to be worked on by another. Such a move is relatively easy, but not effortless. The editor of a proceedings volume for a scientific conference now is likely to ask for manuscripts in ASCII form—but he's likely to ask also that they be accompanied by a hard copy and a description of the software used to create the original, to facilitate getting it from "text only" to publishable form in *his* preferred format.

I'm told that much software can now be moved with similar ease from one machine to another. But it's far from inconceivable that more drastic changes in operating systems in the future will again make this sort of thing more difficult, if designers aren't careful to anticipate and plan for it. And it's virtually certain that the physical form of data storage will undergo still more changes, so that even easily translatable software will not necessarily keep data from being "lost." An ASCII file on an obsolete disk will be useless to a reader designed for a new kind. Old records may still survive such a changeover, but only if somebody anticipates *wanting* to save them while his old machine is still available, functional, and connectable in some way to the new. And the transfer will still cost time, money, and manpower (though nowhere near as much as doing it all by hand).

This type of problem is not limited to computers, of course. One of the hallmarks of this century has been the proliferation of *lots* of forms of information storage, much of it quite impossible before, and all of it subject to periodic radical changes. The evolution of still photographs from black and white to color wasn't much of a problem, but

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A WORD FROM BRIAN THOMSEN

I have always been a history buff, particularly military history. Thus, when I read novels like YAMATO: A RAGE IN HEAVEN or THE WILD BLUE AND THE GRAY my enjoyment is two-fold. In both cases the authors tell a great story, and given each his variant context, get their history right. This is important to me, and I like to think to all readers as well.

It looks like there are a whole lot of people who agree with me because word of mouth and early reviews of both books have been exceptionally good.

When you see me around, let's continue our talk of conflicts, those in the past, and in the far future.

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movies and sound recordings require playback equipment. I've seen one working Edison cylinder phonograph in my life, which is probably one more than most people have. In the early stages of growing up, I heard a fair amount of my music on 78 RPM disks (now nearly unplayable, through no fault of their own), and watched those give way to the vinyl LP.

In the last *very* few years, we've seen LP production cease as the CD became popular. Most people welcome the improved sound, but the change does create problems for those of us with large collections of LPs. Replacing a large collection with CDs is expensive and most of us would find it financially impractical, even if everything on the old disks were available in the new format—which it isn't.

It seems fairly safe to say that most Beethoven will continue to be recorded in new forms (though it's not clear how long or to what extent it will be done by real orchestras); but many less popular composers, and much popular music, will never be commercially reissued. Anyone who still wants to be able to listen to such things will have to make his own arrangements. One option is to buy one or more new LP players, while they're still available, and try to make them last as long as possible. Another is to copy hard-to-replace recordings onto tape (copying home movies onto videotape has already become a business of noticeable size), but there's a movement afoot now to make new recordings difficult or impossible to copy. (The copy protection can be circumvented, of course, by such means as recording the output of speakers with microphones; but that's cumbersome and costs quality.)

Developing new and better ways of storing all kinds of information—text, pictures, sound, or anything else—has such obvious advantages that few would favor attempting to prevent it. But as such progress happens, it will become increasingly important for everyone involved to think ahead about how data stored with *today's* best technology will be translated to tomorrow's. The key question is: do we want to let the information revolution take us in a direction where our time-binding is more ephemeral and therefore less effective than ever before, because records become unreadable in unprecedentedly short times? If not, thought will have to be given on an ongoing basis to how information can be kept accessible to new machines—*before* they have completely replaced the old. ■

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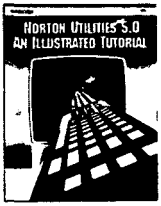

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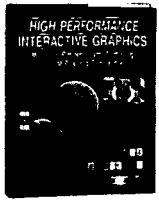

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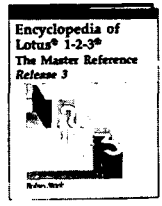

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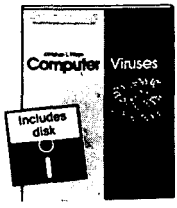

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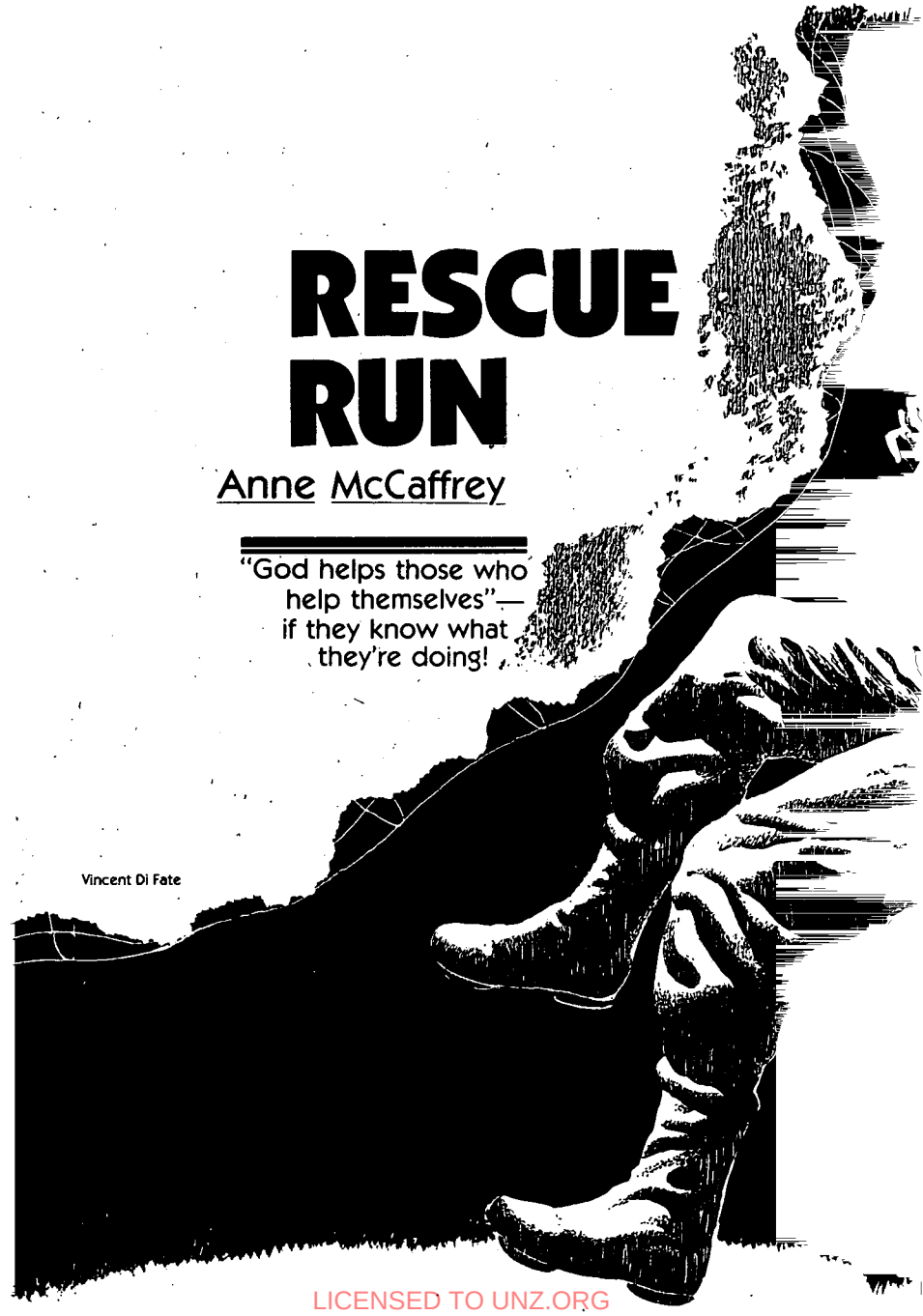
RESCUE RUN

Anne McCaffrey

"God helps those who help themselves"—if they know what they're doing!



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"Ma'am?" Ross Vaclav Benden said in a surprised tone, "there's an orange flag on the Rukbat system." He swiveled from his position toward the *Amherst*'s command chair and the battle cruiser's captain, Anise Fargoe.

The *Amherst* had been assigned to conduct a determined search through the Sagittarian sector of space for any evidence of new incursions by the Nasties. The punitive war of six decades ago proved insufficient to dissuade those intruders from annexing remote elements of the Federation. There had already been incidents in the Rigel sector despite a powerful Federated force. A massive seek-and-destroy operation was now five years in progress with, mercifully, only a few infiltrations discovered. And those, outposts and two space stations, had been obliterated. Not until all adjoining space and every peripheral system had been investigated and warning devices strategically strewn would the Federation enjoy any sense of security. A second prolonged Nasties Campaign would ruin the already depleted Federation. Quick sharp thrusts now, the combined joint staffs had wisely decided, should suffice.

As the *Amherst* had so far had a very boring swing through their sector, Lieutenant Benden's unexpected comment roused everyone on the bridge.

"Orange? This far out?" Captain Fargoe asked, her eyes widening in a flare of excitement. "Didn't know we had colonies in this sector."

"Orange," signified that an investigation should be initiated by any vessel close enough to the flagged system to do so.

"I'm accessing files, ma'am," and Benden, suddenly remembering family history, breathlessly awaited the entry. He tapped his thumbs restlessly on the edge of the keyboard and got a quick repressive glance from old Rezmar Dooley Zane, the duty navigator. "Oh," he added, deflated, as the file header informed him that a distress message had been received from the colony on Pern, Rukbat's only inhabitable planet.

"Well, let's see the message," Captain Fargoe said. Anything to relieve the tedium of the fruitless search through this deserted—almost deserted—sphere of space. "Screen it."

Benden transferred the message to the main screen.

"Mayday! Pern colony in desperate condition following repeated attacks of an uncontacted enemy invasion force employing unknown organism—"

"Nasties don't *need* germ warfare," muttered brash Ensign Cahill Bralin Nev. Someone else snickered.

"—which consumes all organic matter. Must have technical and naval support or colony faces total annihilation. There is wealth here. Save our souls. Theodore Tubberman, colony botanist."

There was an almost embarrassed silence for the tone of the message.

"Hardly the Nasties then," the captain said drily. "Probably some old weapon-system has been triggered. Perhaps one of the Sixty units we ran into in the Red Sector. I thought only survivor types were chosen to be colonists. Mister Benden, what does Library say about this Pern expedition?"

Ross didn't need to search for the official documentation on the expedition.

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He knew most of the tale by heart, but he keyed up the file.

"Captain, a low-tech, agrarian colony was chartered for the third planet of the Rukbat system, under the joint leadership of Admiral Paul Benden and—"

"Your uncle, I believe."

"Yes, Captain," Ross replied, keeping his tone level. Proud though his entire family was of Paul Benden's most honorable service record, he had taken a lot of gibing during his first cadet year when his uncle's victory at Cygnus was telecast as a documentary, and in third year when Admiral Benden's strategy was discussed in Tactics.

"A most able strategist and a fine commander." Fargoe's voice registered approval but her sideways glance warned Benden not to presume on his uncle's sterling record. "Continue, mister."

"Governor Emily Boll of Altair was the other leader. Six thousand plus colonists, chartered and contracted, were transported in three ships, *Yokohama*, *Buenos Aires*, and *Bahrain*. The only other communication was the regulation report of a successful landing. No further contact was expected."

"Humph. Idealists, were they? Isolating themselves and then screaming for help at the slightest sign of trouble."

Ross Benden gritted his teeth, searching for some polite way to assert that Admiral Benden would not have "screamed for help," and he bloody well hadn't sent that craven message.

Fortunately, after a moment's thought, the captain went on, "Not Admiral Benden's style to send a distress message of any kind. So, who's this Theodore Tubberman, botanist, who affixed his name to the place? A mayday should have been authorized by the colony leaders."

"It wasn't a *standard* capsule," Benden replied, having noted that amendation. "But expertly contrapted. It was also sent to Federation headquarters."

"Federation headquarters?" Fargoe sat forward, frowning. "Why HQ? Why not the Colonial Authority? Or the Fleet? No, if it wasn't signed by Admiral Benden, the fleet would have shifted it to the CA." Then she sat, chin on one hand, studying the report, scrolling it forward from her armrest key pad. "A non-standard homing device sent to Federation HQ indicating that the colony was under attack . . . hmm. And nine years after a successful landing, forty-nine years ago.

"How far are we from the Rukbat system, Mister Benden?"

"Point 045 from the heliopause, ma'am. Science officer Ni Morgana wanted a closer look at that Oort cloud. She's interested in cometary reservoirs. That's when I noticed the orange flag on the system."

"They wanted squadrons then?" The captain gave a short bark of laughter. "Nearly fifty years ago? Hmmm. No Nastie activity was noticed that soon after the War. This Tubberman fellow doesn't specify. Maybe that's what he intended. Big unknown alien life form attack might have stirred Federation." She gave a dubious sniff. "What sort of resources does this Pern have, Mister Benden?"

Benden had anticipated that request and inserted a smaller window on the main screen with the initial survey re-

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port. "Pern evidently only had minimal resources, enough to supply the needs of a low-tech colony."

"No, that sort of ore and mineral potential wouldn't have interested any of the syndicates," the captain mused. "Too costly to use an orbiting refinery or to transport the ores to the nearest facility. Nine years after touchdown? Long enough for those agrarian types to settle in and accumulate reserves. And the EEC doesn't list any predators." She paused in her review of the data and made a slight grimace. "Have Lieutenant Ni Morgana report to the bridge," she said over her shoulder to the communications officer.

The captain tapped her fingers on her armrest, which caused the crew to exchange glances. The captain was thinking again!

"Doesn't compute that Paul Benden would send any distress message," she went on. "So where was he when this Tubberman sent off his contraption? Had the menace from outer space done for everyone in authority?"

"Internal conflict?" Benden suggested, not able to believe his resourceful uncle would have been destroyed by a mere organism after surviving all the Nastie Fleet had thrown at him. That would be ironic. And the admiral had certainly researched the colonial scheme from every aspect, but he might have relied on Rukbat's isolated position in Federated space to diminish any hostile attacks. The EEC report listed no hostile organism on the planet. Of course, no one could rule out such a bizarre possibility as an attack by a remnant weapons system. Sections of the galaxy were strewn with the unexploded minefields from ancient wars. Not necessarily of Nastie origin.

The grav shaft whooshed open and Lieutenant Ni Morgana entered, stood to attention, and snapped off a salute. "Captain?" and she tilted her head awaiting her orders.

"Ah, Lieutenant, there is only an Oort cloud surrounding the Rukbat system but it appears to be an orange tagged, distress message," the captain said gesturing for Ni Morgana to read the data which now occupied several windows on the big screen.

"Coming on a bit thick, weren't they? Alien invasion!" Ni Morgana gave a snort of disgust after a quick perusal. "Although," and she paused, pursing her mouth, "it's just possible that the 'unknown organism' has been seeded into the cometary cloud to camouflage it."

"What are the chances of it containing some engineered organism that attacked the planet fifty years ago?" Captain Fargoe was clearly skeptical.

"I am hoping that we can obtain samples of the cloud as we pass it, ma'am," Ni Morgana replied. "It is unusually close in to the system for an Oort Cloud."

"Have Oort clouds ever been found to harbor natural viruses or organisms that could threaten a planet?"

"I know of several cases where it's always been assumed that inimical mechanisms have been launched from one solar system to another—'berserkers' they were called."

"Could the organism this Tubberman mentioned be a Nastie softening agent? Destroying all organic matter seems like a weapon of some kind, doesn't it?"

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"We've learned not to underestimate the Nasties, Captain. Though their methods, so far, have been much more direct." Ni Morgana's smile was tight, understandable when you knew that the science officer was the only survivor of her family, solely because she was at the Academy when the enemy had attacked her home world. "However, since the Nasties have been trying to establish bases far from well traveled space, it becomes a possibility out here."

"Yes, it does, doesn't it?" The captain said thoughtfully and then grimaced. It was the ambition of every member of Fleet and EEC from the lowliest long distance single scout to the commander of the heaviest battle cruiser to discover the Nasties's home world, and Captain Fargo was scarcely an exception.

"Whatever the attack on Pern was, they would not have sent for help unless their situation was desperate," Ni Morgana added. "You are aware that the Colonial Authority exacts punitive payments for such assistance?"

A complex series of expressions rippled across the captain's face. "Far too high for the service they give, and the time it takes them to respond. The colonists would be mortgaged, body, blood, and breath, unto the fourth generation to repay such a debt. Also the message was not sent by Admiral Paul Benden. That's one man I'd like to pipe aboard the *Amherst*."

"He'd scarcely be alive now," Benden heard himself saying. "He was in his seventh decade when he started."

"A good colonial life can add decades to a man's span, Benden," the captain said. "So, I think we can entertain a rescue run to Pern. Lieutenant Zane, plot a course that will take us through the system close enough to this Pern to launch the shuttle. We can give the other planets and satellites a good probe on the swing past. Mister Benden, you'll command the landing party; a junior officer and, say, four marines. I'll want your crew recommendations, and calculations on projected journey to rendezvous with the *Amherst* on her turn back through the system. Allowing, say . . . how long did the EEC survey team take—ah, yes, five days and a bit—allowing five days on the surface to make contact with the colonists and establish their current situation."

"Aye, aye, Captain," Benden replied, trying hard to keep elation out of his voice. Lieutenant Zane on the navigation board shot him a malevolent glance, which he ignored, as he did Ensign Nev to his right who was all but tugging his sleeve to remind Ross that he'd had xeno training.

"I suggest you talk with Lieutenant Ni Morgana, Mister Benden, when she has completed her survey of the Oort cloud matter. There might just be some connection and these ancient weapons can produce some awkward surprises." She awarded Ross Benden a quick nod. "You have the con, Lieutenant Zane." With that, the captain slid from the command seat and left the bridge.

As Saraidh Ni Morgana took her seat at the science terminal, she winked at Ross Benden, which he interpreted as her support in his assignment.

On the 3-D globe on the *Amherst*'s bridge, the ship seemed only centime-

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ters from the edge of the nebulosity that was the Oort Cloud. As she approached at an angle to sample a core through the thickest part of the Cloud, a great net was fired from a forward missile tube on the port side. The net would both collect debris and clear the ship's path. No ship would barrel through such a cloud where particles were as close as tens of meters. The biggest particles were about a kilometer apart. The problem was to avoid collision of the net with anything above a ton, which would tear it and bring the ship's meteorite defence into play.

During the next two weeks, while the *Amherst* passed beyond the cloud, heading in to the Rukbat system, the science officer carefully examined the material. First she asked permission to rig an empty cargo pod with remote waldo controls and monitors. A work party towed the pod out to a point at which there was no risk to the *Amherst* and yet close enough to make frequent trips to the net feasible.

Then, with a work party, she jetted out to the net and selected fragments which might be worth examining. The cargo pod was already divided into sections. At first these were all kept in vacuum status at − 270° Celsius or 3° absolute. Once back in the *Amherst*, Ni Morgana activated the monitors and began one of her legendary forty-hour days.

"I've got a lot of dirty ice," was her initial comment four days later after she'd had some sleep and a second review of her data. "Most of the stuff has identifiable intrusions, particles of rock and metal, but there are also—" there was a long pause, "some very unusual particles that I have never encountered before. Before anyone gets an idea I don't want to give, there is no evidence of any artifact."

As the science officer held five degrees in different disciplines and had landed on three or four dozen alien surfaces, that was an intriguing admission. The next morning she suited up again and jetted around the netted debris, looking for her special interest, "space worms."

Captain Fargoe had approved Lieutenant Benden's preliminary flight data, and Ross continued his study of the EEC survey reports and the two cryptic messages that were the only communications from the colony world.

"If there is a life form," Ni Morgana said at her most tentative in the weekly officer's meeting, "its response time is far too slow for us to discern. There have been some anomalies, both in superconductivity and in cryochemistry, that I want to follow up. I shall begin a series of tests, slowly warming some representative samples, and see what occurs."

The next week she reported, "At − 200° Celsius, some of the larger particles are showing relative movement but whether this is driven by anomalous internal structure, or reacting to the warmer temperature I cannot as yet ascertain."

"Keep in mind at all times, Lieutenant," the captain said at her sternest, "what happened to the *Roma*!"

"Ma'am, I always do!" The 'melting' of the *Roma* when the science officer brought aboard a metal-hungry organism was the cautionary example

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drummed into every science officer.

The following week Ni Morgana was almost jubilant. "Captain, there is a real life form in some of the larger chunks from the Cloud. Ovoid shapes, with an exceedingly hard crust of material, they have some liquid, perhaps helium, inside. They're very strange but I'm sure they're not artifacts. I'm bringing one sample up above 0° C this week."

The captain held up an admonishing finger at her science officer. "At all times, keep the *Roma* in mind."

"Ma'am, even the situation on the *Roma* didn't happen in a day."

In the process of leaving the conference room, the captain stopped and stared quizzically at Ni Morgana. "Are you deliberately misquoting something, Lieutenant?"

"Mister Benden!" The peremptory summons of the science officer over the comunit by his ear jolted Ross Vaclav Benden out of his bunk and to his feet.

"Ma'am?"

"Get down to the lab on the double, mister!"

Benden struggled into his shipsuit as he ran down the companionway, stabbing feet into soft shipshoes. It was o-dark-hundred of the dog watch, for no one was even in Five Deck's lounge area as he raced across it and to the appropriate grav shaft down to the lab. He skidded to a halt at the door, skinning his forearms on the frame as he braked and fell into the facility. He almost knocked over Lieutenant Ni Morgana. She pointed to the observation chamber.

"Funkit, what in the name of the holies is that?" he wanted to know as his eyes fell on the writhing greyish pink and puke-yellow mass that oozed and roiled on the monitor screen. He could understand why everyone was standing well back even if the mass was, in reality, ten kilometers from the *Amherst*.

"If that is what fell on Pern," Ni Morgana said, "I don't blame 'em for shrieking for help!"

"Let me through," and the captain, clad in a terry-cloth caftan, had to exert some strength to push pass the mesmerized group watching the phenomenon. "Gods above! What have you unleashed, mister?"

"We're taping the show, ma'am," Ni Morgana said as well as prominently waving the hand she held over the "destruct" button that would activate laser fire. Benden could see her eyes glittering with clinical fascination. "According to the readings I'm getting, this complex organism exhibits some similarity to Terran mycorrhizoids in its linear structure. But it's enormous! Damn!"

The organism suddenly collapsed in on itself and became a thick viscous inanimate puddle. The science officer tapped out some commands on the waldo keyboard and a unit extruded towards the mass, scooped up a sample in a self-sealing beaker, and retreated. Lights glittered on the remote testing apparatus that analyzed the sample.

"What happened to it?" Captain Fargoe demanded and Benden admired how firm her voice was. He was very much aware that he had the shakes.

"I should be able to tell you when the analysis is finished on that sample of the residue but I'd hazard the guess

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that, with such rapid expansion, if it found no sustenance in the chamber—and there was none apart from a very thin atmosphere—that it died of starvation. That's only a guess."

"But," Benden heard himself saying, "if this *is* the Pern organism—"

"That's only a possibility at this point," Ni Morgana said quickly. "We must first discover how it managed to get from the Cloud to Pern's surface."

"Good point," the captain murmured and Benden was almost angry at her amused tone. There was nothing remotely funny about what they had just witnessed.

"But if it did, and it's what attacked Pern, I can't blame 'em for wanting help," said Ensign Nev whose complexion was still slightly green.

The captain gave him a long look that caused him to flush from neck to a scalp that was visible under his latest space trim.

"Captain," Ni Morgana said as she pressed the destruct button, destroying it by laser fire, "I request permission to join the Pern landing party to pursue my investigation of this phenomenon."

"Granted!" The captain paused, stepping over the lintel of the lab, with a wicked grin. "I always prefer volunteers for landing parties."

Whoever might have envied Lieutenant Benden the assignment had different feelings once the details of the "organism" became scuttlebutt. A concise report from Lieutenant Ni Morgana was published to quell the more rampant speculations and her lab team became welcome as experts at any mess.

Ross Vaclav Benden had nightmares about his uncle: the admiral, unexpectedly garbed in dress whites, great purple sash of the Hero of the Cygnus Campaign, and a full assortment of other prestigious and rare decorations on his chest, struggled against engulfment by the monstrosity of the lab chamber. Determined to do his best by his uncle, Ross studied, to the point of perfect recall, the EEC valuation of Pern. The terse all-safe message by Admiral Benden and Governor Boll and Tubberman's mayday were easy to memorize, the latter tantalizingly ambiguous. Why had the colony botanist sent the message? Why not Paul Benden or Emily Boll, or one of the senior section heads?

Although this was not Benden's first landing party command, he believed in checking and double-checking every aspect of the assignment. Since there might be hostile conditions including omnivorous organisms and other enigmas to be solved or avoided on Pern's surface, Ross Benden judiciously plotted an alternative holding orbit until the escape window opened up for their rendezvous with the *Amherst*. The landing party had five days, three hours, fourteen minutes on the surface to conduct its investigations. To his chagrin, Ni Morgana asked for Ensign Nev as the junior officer.

"He needs some experience, Ross," Ni Morgana said, blandly ignoring Benden's disgruntlement, "and he's had *some* xeno training. He's strong and he obeys orders even as he's turning green. He's got to learn sometime. Captain Fargoe thinks this could give him valuable experience."

Benden had no option but to accept

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the inevitable but he asked for Sergeant Greene to command his marines. That tough burly man knew more about the hazards that could embroil landing parties than Benden ever would. Having seen the organism which Saraidh had unleashed, Ross wanted solid experience to offset Nev's ingenuousness. If that was the proper word for the boy.

"Just what were you like as an ensign, Lieutenant?" Ni Morgana asked, giving him a sly sideways glance.

"I was never that gauche," he replied tartly, which was true enough, since he'd been reared in a service family and had absorbed proper behavior with normal nutrients. Then he relented, grinning wryly back at her as he remembered a few incidents that he hoped she had no access to. "This sounds like a fairly routine mission: find and evaluate."

"Let's hope so," Saraidh replied earnestly.

Ross Benden was, in another sense, delighted to be teamed up with the elegant science officer. She was his senior in years but not in Fleet, for she had done her scientific training before applying to the Service. She was also the only woman who kept her hair long, though it was generally dressed in intricate arrangements of braids. The effect was somehow regal and very feminine: an effect at variance with her expertise in the various forms of contact sport that were enjoyed in the *Amherst*'s gym complex. If she had made any liaisons on board, they were not general knowledge though he'd overheard speculation about her tastes. He had always found her agreeable company and a competent officer, though they hadn't shared more than a watch or two until now.

"Did you see the tape of that thing?" Ross Benden heard the nasal voice of Lieutenant Zane saying later as he passed the wardroom. "There'll be no one left alive down there. Ni Morgana has proved the Oort Cloud generated that life form, so it wasn't Nastie manufacture. There's no rationale for taking a chance and landing on that planet if any of those *things* are alive down there! And they could be with an entire planet to eat up."

Benden paused to listen, knowing perfectly well that, despite the dangers involved, Zane would have given a kidney to be in the landing party. Nev was at least an improvement on the sour and supercilious Zane. And when the navigation officer added some invidious remarks that Benden was only chosen because of his relationship to one of the leaders of the colony, Benden passed quickly down the corridor before his temper got the better of his discretion.

As the *Amherst*'s majestic passage through the system approached the point where the shuttle could be launched, Benden called for a final briefing session.

"We'll spiral down to the planetary surface in a corkscrew orbit which will allow us to examine the northern hemisphere on our way to the site of record on the southern continent at longitude 30°," he said, calling up the flight-path on the big screen in the conference room. "We've landmarks from the original survey of three volcanic cones that ought to be visible from some distance as we make our final approach. Survey report said the soil there would

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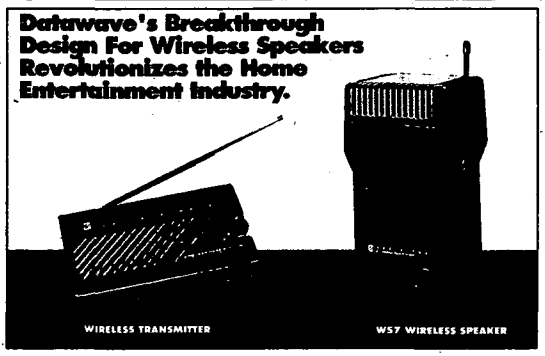

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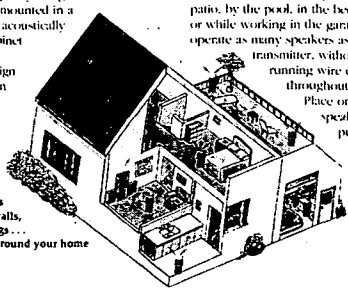

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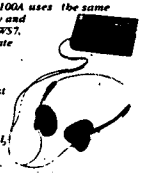

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be viable for hardy Earth and Altairian hybrids so it is reasonable to assume that they started their agrarian venture there. The Tubberman mayday came in some nine years after landing so they should have been well entrenched."

"Not enough to avoid that organism," Nev said flatly.

"Your theory would hold water, Ensign," Saraidh said at her mildest, "if I could figure out how the organism transported itself from the Oort Cloud to Pern's surface."

"Nasties sowed it in Pern's atmosphere," Nev responded with no hesitation.

"Nasties are more direct in their tactics," the science officer replied with a diffident shrug, and turned to Benden with a question.

"We taught 'em to be cautious, Lieutenant," Nev went on. "And devious. And . . . "

"Nev!" Benden called the ensign to order.

Benden kept his expression neutral but he wondered if Ni Morgana was regretting her choice of the irrepressible Nev and his wild theories. If the science officer hadn't found a transport vector for the organism, the Nasties were unlikely to have discovered it. Their *forte* was metallurgical, not biological. Nev subsided and the briefing continued.

"Once we have made landfall, we may also have answers to that question and others. It is obvious our search must begin at the site of record. We will also have made a good sweep of the entire planetary surface and can deviate if we find traces of human settlements elsewhere. We board the *Erica* at 0230 tomorrow morning. Any questions?"

"What do we do if the place is swarming with those *things?*" asked Nev, swallowing hard.

"What would you do, Nev?" Benden asked.

"Leave!"

"Tut tut, mister," Ni Morgana said. "How will you ever increase your understanding of xenobiological forms unless you examine closely whatever samples come your way?"

Ensign Nev's eyes bugged out. "Begging your pardon, Lieutenant, but *you're* the science officer."

"Indeed I am," and Ni Morgana rose, the scrape of her chair covering a mutter of gratitude from the end of the table occupied by the four marines assigned to the landing party.

Launched from the *Amherst*, the gig proceeded at a smart inner system speed toward the blue pebble in the sky that was Rukbat's third planet. It began to dominate the forward screen, serene and clear, beautiful and innocuous. Benden had plotted the gig's course to intercept the geosynchronous orbit of the three colony ships to see if the colonists had left a message to be retrieved. But when he opened communications, the only response was the standard identification response, stating the name and designation of the *Yokohama*.

"That might not mean anything," Saraidh remarked as Benden looked disappointed. "If the colony's up and running, they won't have much use for these hulks. Though I find that sight rather sad," she added as Rukbat suddenly illuminated the deserted vessels.

"Why?" Nev asked, surprised by her observation.

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Saraidh gave a shrug of her slender, elegant shoulders. "Look up their battle records and you might appreciate their present desuetude more."

"Their what?" Nev looked blank.

"Look up that word, too," she said and, in an almost cloying tone, spelled it for him.

"Old sailors never die, they just fade away," Benden murmured, eyes on the three hulks, feeling a constriction in his throat and a slight wetness in his eyes as the gig drifted away from them, leaving them to continue on their ordained path.

"Soldiers, not sailors," Saraidh said, "but the quotation is apt." Then she frowned at a reading on her board. "We've got two beacons registering. One at the site of record and another much further south. Enlarge the southern hemisphere for me, will you, Ross? Along 70° longitude and nearly twelve hundred klicks from the stronger one." Ross and Saraidh exchanged looks. "Maybe there are survivors! Pretty far south though, over mountain ranges of respectable height. I read altitudes from 2,400 rising to more than 9,000 above sea level. We'll land at the site of record first."

As the gig slanted in over the northern pole, it was obvious that this hemisphere was enduring a stormy and bitterly cold winter; most of the landmass was covered by snow and ice. Instruments detected no source of power or light, and very little heat radiation in areas where humans usually settled; the river valleys, the plains, the shoreline. There was one hiccup of a blip over the large island, just off the coast of the northern hemisphere. The reading was too faint to suggest any significant congregation of settlers. If they had followed the usual multiplication so characteristic of colonies, the population should now be close to the 500,000 mark, even allowing for natural disasters and those morality patterns normal for a primitive economy.

"We'll do another low level pass if we've time later. The settlers were determined to be agrarian but they might be using fossil fuels," Saraidh said as they plunged toward the equator, leaving the snowclad continent behind them and slanting down across the tropical sea. "Lots of marine life. Some big ones," she added. "Bigger than the survey team reported."

"They took Terran dolphins with them," Nev said. "Mentasynth-enhanced dolphins," he added, as if that altered the fact.

"I don't think rescuing dolphins is what Captain Fargoe has in mind, even if we had the facility to do so," Saraidh said. "Have either of you any training in other species' communications? I don't. So, let's table that notion for now."

"There's another consideration: How long do dolphins live?" Ross asked. "Remember, this trouble started when the colony was down eight to nine years. In your report, Lieutenant, you did mention that further tests with the organism proved that water drowned it and organic fire consumed it. Mentasynth-enhanced creatures have good memories, sure. But how many generations of dolphins have there been? Would they even be aware of what happened on land? Much less remember?"

"Would they want to, is more the case," Saraidh said. "They're indepen-

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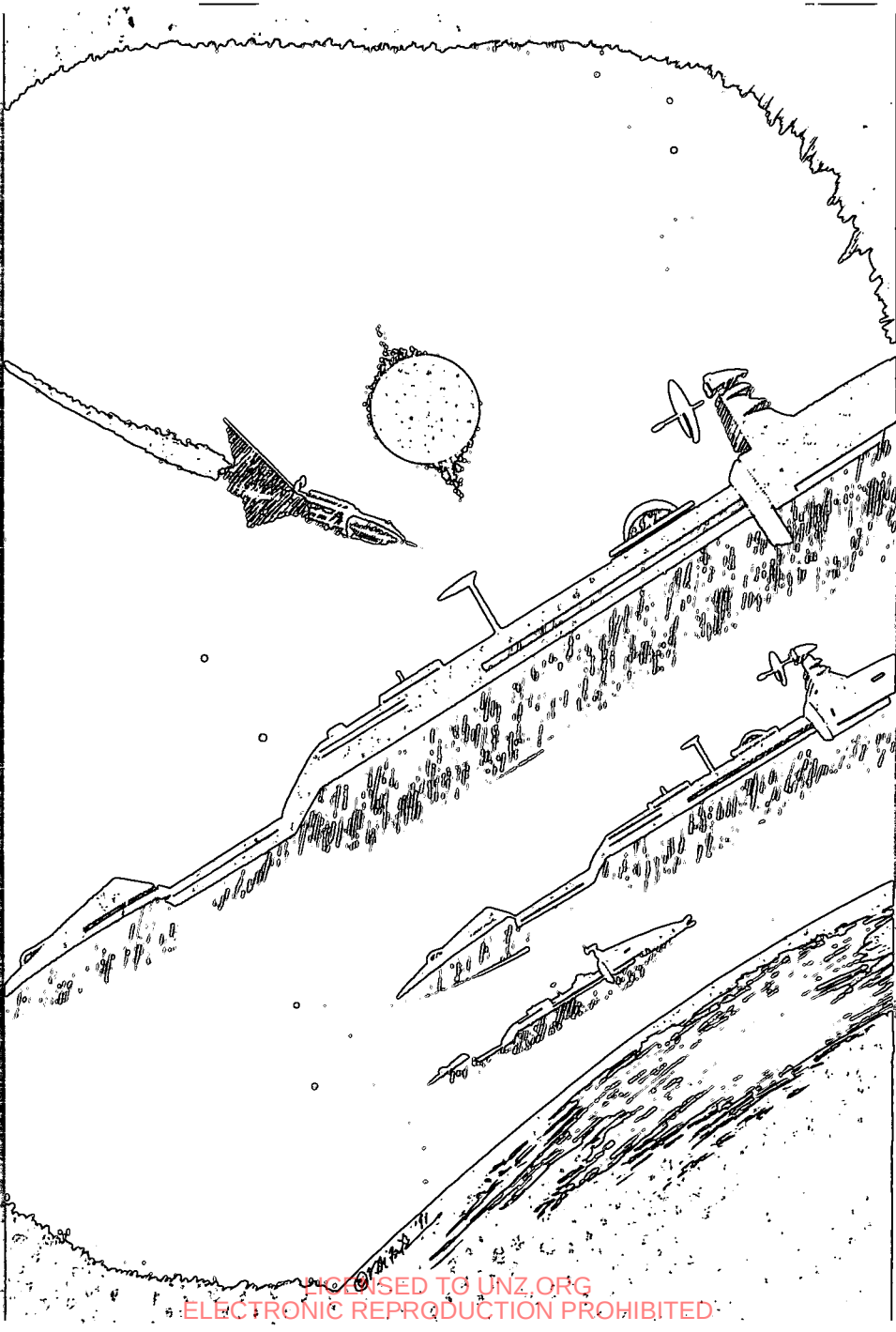

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dent and very intelligent. Clearly they have survived and multiplied from the complement that came with the colony. They'd cut their losses and survive on their own. I would, if I were a dolphin."

Then Saraidh started the recorders on the gig's delta wing to take a record of the plunging antics of the large marine life as the *Erica* swooped over the ocean on their final descent toward the site of record.

"Records state that the *Bahrain* brought fifteen female dolphins and nine males," Nev said suddenly. "Dolphins produce—what? once a year. There could be nearly eight hundred of 'em in the seas right now. That's a lot of terrestrial life forms we'd be abandoning."

"Abandoning? Hell, Cahill, they're in their element. Look at them, they're doing their damnedest to keep pace with us."

"Maybe they have a message for us," Nev went on earnestly.

"We look for humans first, Ensign," the science officer said firmly. "Then we'll check the dolphins! Ross, I'm not getting anything from the ship-to-ground interface that's recorded for the site. It's inoperative, too."

"Now hear this! Buckle up for landing," Ross said, opening a channel to the marines' quarters.

"Muhlah!" was Saraidh's awed comment as they saw the two ruined volcanic craters and the smoking cone of the third.

Ross could say nothing, appalled by the extent of the eruption. He'd expected nothing so catastrophic as this. Or had this devastation occurred *before* the organism had begun to fall? While he had more or less resigned himself that he was unlikely to encounter his uncle, he had hoped to chat with the admiral's descendants. He certainly hadn't anticipated this level of devastation. They flew over the landing field tower, its beacon now blinking, activated by the proximity of the gig.

"See those mounds, just coming up on portside?" Saraidh pointed. "They've got the outlines of shuttles. How many did the colonists have?"

"Records say six," Nev replied. "*Bahrain* had one, *Buenos Aires* two, and the *Yoko* three. Plus a captain's gig."

"Only three parked there now. Wonder where the others went."

"Maybe they were used to get out of this place when the volcano blew?"

"But where to? There were no signs of human habitation on the northern continent," Benden said, sternly repressing his dismay.

Saraidh let out a thin high whistle. "And those other regular mounds are—were—the settlement. Neatly, if not aesthetically, laid out. Must have built well, for nothing seems to have collapsed from the weight of ash and dirt. Lava's cooled. Ross, got a reading of how deep that ash is over the ground?"

"We do indeed, Saraidh," Ross replied with relief. "A metallic grid is present a half meter below the surface. No problem landing—it'll be nice and soft."

Which it was. While waiting for the disturbed ash to settle, both officers and marines suited up, checking masks, breathing tanks, and strapping on lift

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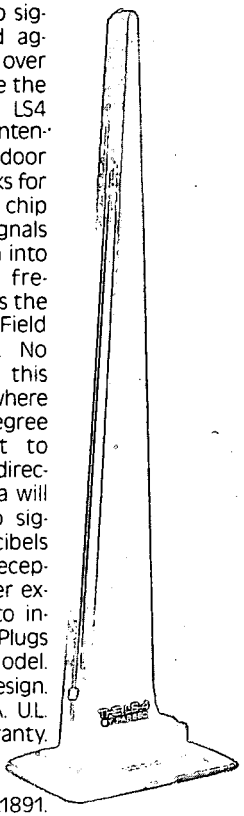

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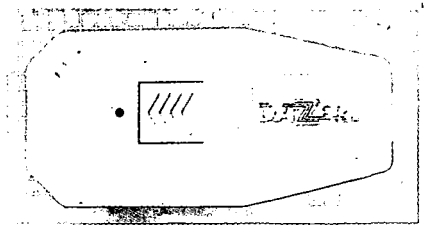

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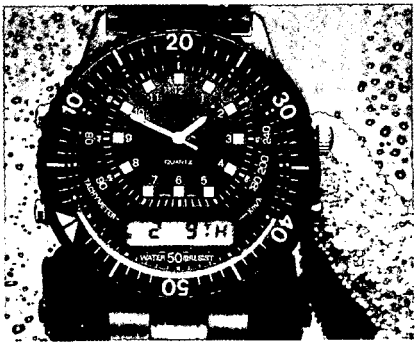

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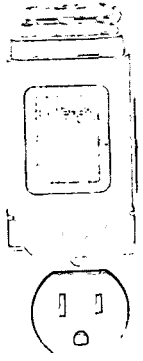

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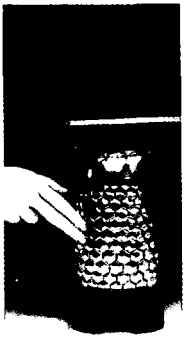

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belts. These would convey them safely above the ash to the settlement.

"What're those?" one of the ratings asked as the landing party assembled to hover a meter above the ash-coated ground outside the *Erica*. He pointed to a series of long semicircular mounds, bulging up out of the ash. "Tunnels?"

"Unlikely. Not big enough and don't seem to go anywhere," Ni Morgana said, deftly manipulating her attitude and forward jets. She hovered to one side of the nearest mound and pushed with her foot. It collapsed with a dusty implosion and a stench that the filters of their masks worked hard to neutralize. "Faught! Dead organism. Now, why didn't that puddle?" She took out a specimen tube and carefully gathered some of the residue, sealing it, and putting that tube in a second padded container.

"It fed on ash or green or something?" asked Ensign Nev.

"We'll check that out later. Let's look at the buildings. Scag, stay by the gig," Benden ordered one of the marines. And then gestured for the others to follow him up to the empty settlement.

"Not empty," Ross said an hour later, increasingly more pessimistic about finding any survivors. Contact with a cousin or two would be something to write home about. So he clutched at a vain hope. "Emptied. They didn't leave a thing they could use. Nasties would have obliterated any trace of humans."

"That's true enough," Saraidh said. "And there's no evidence of Nasties at all. Merely an evacuated settlement. There is that second beacon to the southwest. There's certainly nothing here to give us any explanation. Your point about everything being emptied is well taken, Benden. They closed shop here but that doesn't mean they didn't open it up elsewhere."

"Using the three missing shuttles," Nev added brightly.

Airborne again in the *Erica*, heading directly toward the beacon, they overpassed the rest of the settlement, taping the one smoking volcano crater and the melted structures below it. No sooner were they over the river than the landscape showed another form of devastation. The prevailing winds had minimized the dispersal of volcanic dust but oddly enough, there were only occasional stands of vegetation and large circles of parched soil.

"Like something had sprinkled the land with whopping great acid drops," Cahill Nev said, awed at the extent of the markings.

"Not acid. No way," Benden replied. He keyed the relevant section of the report he knew so well. "The EEC survey team found similar circular patches and they also reported that botanical succession had started."

"It has to be the Oort organism," Nev said enthusiastically. "On the cruiser it died of starvation. It had plenty to eat here."

"The organism has to get here first, mister," Ni Morgana said bitingly. "And we haven't established how it could cross some 600 million miles of space to drop on Pern." Ross, glancing at her set expression, thought she was rapidly considering improbable transport media. "Terrain's flat enough here, Mister Benden, try a low level

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pass and give us a closer look at that . . . that diseased ground."

Benden obliged, noting once again how responsive the *Erica* was to the helm, smoothly skimming the often uneven terrain. Not that he expected something to pop up out of those polka dots, but you never knew on alien worlds. Even ones thoroughly surveyed by exploration and evaluation teams. They might not have found any predators but something dangerous had put in an appearance nine years after the settlers took hold. And the Tubberman appeal hadn't mentioned a volcanic eruption.

Klick after klick they passed over circles and overlapping circles and triple circles. Ni Morgana remarked that some succession was visible on their peripheries. She asked Benden to land so she could take more samples, including clods of the regenerating vegetation. Across a broad river there were swaths of totally unharmed trees and acres of broad leafed and unscathed vegetation. Over one wide pasture they caught sight of a cloud of dust, but whatever stirred it disappeared under the broad leaves of a thick forest. They spotted no trace of human habitation. Not even a dirt-covered mound that might be the remains of a building or a wall.

The second beacon signal became stronger as they neared the foothills of a great barrier of mountains, snow clad even in what must be high summer in this hemisphere. Gradually the pips altered from rhythmic bleeps to a sustained note as they homed in on the beacon.

"There's nothing here but a sheer cliff," Ross said, disgusted as he let the gig hover over the destination, the single note acerbating his nerves.

"That may well be, Ross," Saraidh said, "but I'm getting body-heat readings."

Nev pointed excitedly. "That plateau below us is too level to be natural. And there are terraces below it. See? And what about that path down into the valley. And hey, this cliff has windows!"

"And is definitely inhabited!" exclaimed Saraidh, pointing to starboard where a doorway appeared in the cliff face.

"Put her down, Ross!"

By the time the *Erica* had settled to the smoothed surface, a file of people came running down the plateau toward it: their cries, audible from the exterior speakers, were of hysterical welcome. They ranged in age from early twenties to late forties. Except for the white-haired man, his mane trimmed to shoulder length, whose lined face and slow movements suggested a person well into his eighth or ninth decade. His emergence halted the demonstrations and the others stood aside to allow him a clear passage to the gig's portal, where he halted.

"The patriarch," Saraidh murmured, straightening her tunic and settling her beaked cap straight on top of her braids.

"Patriarch?" Nev asked.

"Look it up later—if the term is not self-explanatory," Benden shot at him over his shoulder, operating the airlock release. He glanced warningly at the marines, who replaced their drawn hand weapons.

As soon as the airlock swung open and the ramp extruded, the small crowd was silent. All eyes turned to the old man who pulled himself even more

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erect, a patronizing smile on his weathered face.

"You finally got here!"

"A message was received at Federated headquarters," Ross Benden began, "signed by a Theodore Tubberman. Are you he?"

The man gave a snort of disgust. "I'm Stev Kimmer," and he flicked one hand to his brow in a jaunty parody of a proper Fleet salute. "Tubberman's long dead. I designed that capsule, by the way."

"You did well," Benden replied. Inexplicably, Benden suddenly did not care to identify himself. So he introduced Saraidh Ni Morgana and Ensign Nev. "But why did you send that capsule to Federation Headquarters, Kimmer?"

"That wasn't my idea. Ted Tubberman insisted." Kimmer shrugged. "He paid me for my work, not my advice. As it is, you've taken nearly too damned long to get here." He scowled with irritation.

"The *Amherst* is the first vessel to enter the Sagittarian Sector since the message was received." Saraidh Ni Morgana said, unruffled by his criticism. She had noted that Ross had not given his name. She hoped that Ensign Nev had also noted the omission. "We've just come from the site of record—"

"No one came back to Landing, then?" Kimmer demanded. Benden thought his habit of interrupting Fleet officers could become irritating. "With Thread gone, that'd be the place they'd return to. The ground-to-ship interface's there."

"The interface is inoperative," Benden said, carefully neutral as the old man's arrogance grated on him.

"Then the others are dead," Kimmer stated flatly. "Thread got 'em all!"

"Thread?"

"Yes, Thread." Kimmer's palpable anger was tinged with deep primal emotions, not the least of which was a healthy fear. "That's what they named the organism that attacked the planet. Because it fell from the skies like a rain of deadly thread, consuming all it touched, animal, man, and vegetable. We burned it out of the skies, on the ground, day after fucking day. And still it came. We're all that's left. Eleven of us, and we only survived because we have a mountain above us and we hoarded our supplies, waiting for help to come."

"Are you positive that you're the sole survivors?" Ni Morgana asked. "Surely in the eight or nine years you had before this menace attacked you—"

"Before Thread fell, the population was close to 20,000 but we're all that's left," Kimmer said, now defiant. "And you cut it mighty fine getting here. I couldn't risk another generation with such a small gene pool." Then one of the women, who bore a strong resemblance to Kimmer, tugged at his arm. And he made a grimace that could be taken for a smile. "My daughter reminds me that this is a poor welcome for our long-awaited rescuers. Come this way. I've something laid by in the hope of this day."

Lieutenant Benden gestured for the two marines to remain on board before he followed Ni Morgana down the ramp, Nev treading on his heels in his

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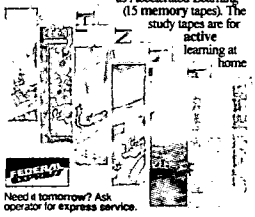

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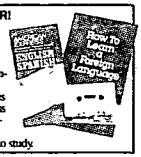

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eagerness.

The silence which had held Kimmer's small group while he had addressed the spacemen relaxed now into gestures and smiles of welcome. But Benden took note of the tenseness of the oldest three men. They stood just that much apart from the women and youngsters to suggest they distanced themselves deliberately. They had a distinctly Asian cast of countenance, jet black hair trimmed neatly to their earlobes; they were lean and looked physically fit. The oldest woman, who bore a strong resemblance to the three men, walked just a step behind Kimmer in a manner that suggested subservience: an attitude which Benden found distasteful as he and his party followed them to the entrance.

The three younger women were ethnic mixes in feature, though one had brown hair. All were slender and graceful as they tried to contain their excitement. They whispered to each other, casting glances back at Greene and the other marine. At a brusque order from Kimmer, they ran on ahead, into the cliff. The three youngest, two boys and a girl, showed the mixing of ethnic groups more than their elders. Benden wondered just how close the blood bonding was. Kimmer would not have been fool enough to sire children on his own daughters?

Exclamations of surprise were forced from each of the three officers as they entered a spacious room with a high, vaulting ceiling; a room nearly as big as the gig's on-ship hangar. Nev gawked like any off-world stupe, while Ni Morgana's expression was of delighted appreciation. This was clearly the main living space of the cliff dwelling for it had been broken up into distinct areas for work, study, dining, and handcrafts. The furnishings were made of a variety of materials, including extruded plastic in bright hard colors. The walls were well hung with curious animal furs and hand-loomed rugs of unusual design. Above those, and all along the upper wall space, a vivid panorama had been drawn: first of stylized figures standing or sitting before what were clearly monitors and keyboards. Other panels showed figures who plowed and planted fields or tended animals of all sorts; panels which led around to the innermost wall that was decorated by scenes Benden knew too well, the cities of Earth and Altair and three spaceships with unfamiliar constellations behind them. At the apex of the ceiling vault was the Rukbat system . . . and one planet was shown to have a highly elliptical, and possibly an erratic orbit from slightly beyond the Oort cloud to an aphelion below Pern's.

Ni Morgana nudged Benden in the ribs and said in a barely audible whisper. "Unlikely as it seems, I've just figured out one way the Oort organisms might have reached Pern. I'll be damned sure of my theory before I mention it."

"The murals," Kimmer was saying in a loud and proprietary voice, "were to remind us of our origins."

"Did you have stone-cutters?" Nev asked abruptly, running his hand over the glassy smooth walls.

One of the older black-haired men stopped forward. "My parents, Kenjo and Ito Fusaiyuki, designed and carved all the principal rooms. I am Shensu.

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These are my brothers, Jiro and Kimo: our sister, Chio." He gestured to the woman who was reverently withdrawing a bottle from a shelf in a long dresser.

With a searing glance at Shensu, Kimmer hastily took the initiative again. "These are my daughters, Faith and Hope. Charity is setting out the glasses." Then with a flick of his fingers, he indicated Shensu. "You may introduce my grandchildren."

"Pompous old goat," muttered Ni Morgana to Benden but she smiled as the grandchildren were introduced as Meishun, Alun and Pat, the two boys being in their mid-teens.

"This Stake could have supported many more families if only those who had said they'd join us had kept their promises," Kimmer went on bitterly. Then with an imperious gesture, he waved the guests to come to the table and be served of the wine he was pouring; a rich fruity red.

"Welcome, men and women of the *Amherst*!" was Kimmer's toast and he touched glasses with each of them.

Benden noticed as Ni Morgana did, that the others were served a paler red by Meishun. Watered, Benden thought. They could at least be equal to us, today of all days! Shensu hid his resentment better than his brothers did. The women seemed not to notice, for they passed dishes of cheese bits and tasty small crackers to everyone. Then Kimmer gestured for the guests to be seated. Benden gave a discreet hand signal to the two marines who took the end seats at the long table and remained watchful, taking only small sips of the celebratory wine.

"Where to start?" Kimmer began, setting his wine glass down deliberately.

"The beginning," Ross Benden said wryly, hoping that he might learn what had happened to his uncle before disclosing his identity. There was something about Kimmer—not his anger nor his autocratic manner—that Benden instinctively distrusted. But perhaps a man who had managed to survive in a hostile environment had the right to a few peculiarities.

"Of the end?" And Kimmer's spiteful expression served to increase Benden's dislike.

"If that is when you and the botanist Tubberman sent that homing device," Benden replied, encouragingly.

"It was and our position was then hopeless, though few were realists enough to admit it, especially Benden and Boll."

"Could you have got back up to the colony ships then?" Ni Morgana asked, nudging Ross Benden when she felt him stir angrily.

"No way," and Kimmer snorted with disgust. "They used what fuel the gig had left to send Fusaiyuki up to reconnoiter. They thought they might be able to divert whatever it was that brought the Thread. That was before they realized that the wanderer planet had dragged in a tail that would shower this wretched planet with Thread for fifty frigging years. And if that wasn't bad enough, they let Avril steal the gig and that was the end of any chance we had of sending someone competent for help." The recital of that forty-year-old memory agitated Kimmer, and his face became suffused with red.

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"It was definitely established that the organism had been carried from the Oort Cloud?" Ni Morgana asked, her usually calm voice edged with excitement.

Kimmer gave her a quelling glance. "In the end that was all they discovered despite their waste of fuel and manpower."

"There were only three shuttles left at the landing site. D'you suppose some people managed to escape in them?" said Ni Morgana in a deliberately soothing tone. Benden could see the glitter of her eyes as she sipped calmly at her wine.

Kimmer glared at her with contempt. "Where could they escape to? There was no fuel left! And powerpacks for sleds and skimmers were in short supply."

"Barring the lack of fuel, were the shuttles still operational?"

"I said, there was no fuel. No fuel," and he banged his fist on the table.

Benden, looking away from the man's deep bitterness, noted the faint look of amusement on Shensu's face.

"There was no fuel," Kimmer repeated with less vehemence. "The shuttles were so much scrap without fuel. So I haven't any idea why there'd be only three shuttles at Landing. I left the settlement shortly after the bitch blew the gig up." He glared impartially at the *Amherst* officers. "I had every right to leave then, to establish a Stake and do what I could to preserve my own skin. Anyone with any sense, charterer or contractor, should have done the same. Maybe they did. Holed up to wait out the fifty years. Or, maybe they sailed away into the rising sun. They had ships, you know. Yes, that's it. Old Jim Tillek sailed them out of Monaco Bay into the rising sun." He gave a bark of harsh laughter.

"They went west?" Benden asked.

Kimmer favored him with a contemptuous glance and made a wild gesture with one arm. "How the hell would I know? I wasn't anywhere near the place."

"And you settled here?" Ni Morgana asked blandly, "in the dwelling built by Kenjo and Ito Fusaiyuki?"

Her phrasing was, Benden thought, a little unfortunate, for the question angered Kimmer even more. The veins in his temples stood out and his face contorted.

"Yes, I settled here when Ito begged me to stay. Kenjo was dead. Avril killed him to get the gig. Ito'd had a difficult birth with Chio and his kids were too young to be useful then. So Ito asked me to take over." Someone's breath hissed on intake and Kimmer glared at the three sons, unable to spot the culprit. "You'd all have died without me!" he said in a flat but somehow cautionary tone.

"Most assuredly," Shensu said, his surface courtesy not quite masking a deep resentment.

"You have survived, haven't you? And my beacon brought us help, didn't it!" Kimmer banged on the table with both fists and sprang to his feet. "Admit it! My homer and my beacon have brought us rescue."

"They did indeed lead us to you, Mr. Kimmer," Benden said in a tone he barefacedly borrowed from Captain Fargoe when she was dressing down an insubordinate rating. "However, my

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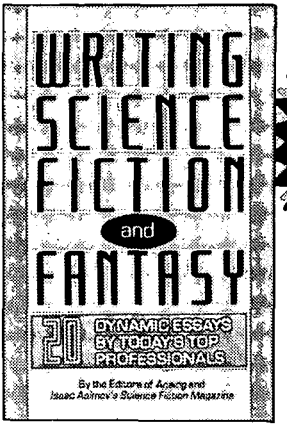

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orders are to search and discover any and *all* survivors on this planet. You may not be the only ones."

"Oh yes, we are. By all the gods, we're the only ones," Kimmer said, with an edge of panic in his voice. "And you can't leave us here!" His eyes turned a bit wild.

"What the lieutenant means, Mr. Kimmer," Ni Morgana put in soothingly, "is that our orders are to search for any other survivors."

"No one else survived," Kimmer said in a flat, toneless voice. "I can assure you that." He splashed wine into his glass and drank half of it, wiping his mouth with a trembling hand.

Because Ross Benden was not looking at the old man just then but at the three brothers seated across the table, he caught the glitter in the eyes of Shensu and Jiro. He waited for them to speak up but they remained silent and inscrutable. Palpably they had knowledge that they would not communicate to their rescuers in front of Stev Kimmer. Well, Benden would see them privately later. Meanwhile, Kimmer was coming across as a somewhat unreliable opportunist. He might assert that he had the right to set off and establish a Stake when the colony was obviously in terrible straits, but, to Benden, it sounded more as if Kimmer had fled in a craven fashion. Was it just luck that he had known where to find Ito, and this Kenjo's Stake?

"My sled had a powerful comunit," Kimmer went on, revived by the wine, "and once I'd erected the beacon on the plateau here, I listened in to what was broadcast. Not that there was anything important beyond where the next Fall was. How many power packs had been recharged. If they had enough sleds able to cover the next Fall. A lot of the stakeholders had come back to Landing by then, centralizing resources. Then, after the volcanoes blew, I heard their messages as they scurried away from Landing. There was a lot of static interference and transmissions got so fragmented that I couldn't hear most of what was said. They were frantic, I can tell you, by the time they abandoned Landing. Then the signals got too weak for me to pick up. I never did find out where they planned to go. It might have been west. It might have been east.

"Oh," and he waved one hand helplessly, "I tried when the last signal died. I only had one full power pack left by then. I couldn't waste that in futile searches, now could I? I'd Ito and four small kids. Then Ito got so ill. I went back to Landing to see if they'd left any medicines behind. But Landing was covered in ash and lava, great rivers of it, hot and glowing. Damned near singed the plastic off the hull.

"I checked all the stations on the lower Jordan. Paradise River, Malay, even Boca where Benden lived. No one. Fierce waste of material, though, piled as storm wrack along the coast at one point. Looked to me as if they'd lost the cargo ships in a storm. We got bad ones blowing in from the sea—or maybe the aftermath of a tsunami. We had one of those after some sea volcano blew up to the east somewhere. Missed us though on Bitkim Island.

"Last message I ever heard, and only parts of it at that, was Benden telling everyone to conserve power, stay inside, and just let that frigging Thread

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fall. I guess it got him, too."

Ni Morgana's thigh deliberately pressed against Benden's and he took it as sympathy. Though the old man's rambling had been confused and sometimes he contradicted himself, his statement had the ring of truth as he sat silently contemplating his wine glass. Then he roused, raising a finger to bring Chio to his side. She refilled his glass. Then, with an apologetic smile, she offered wine to the other guests, whose glasses were barely touched. Down the table from Kimmer, the three brothers sat very close together, saying little but looking with a thinly veiled hatred of Kimmer.

"We had eight good years on Pern before disaster struck," Kimmer was saying now, casting further back in his memory. "I heard that Benden and Boll swore blind that they could lick Thread. Except for Ted Tubberman and a few others, they had half the colony behind them, too entranced by the great reputations of the admiral and the governor," and the titles were pronounced disparagingly, "to believe they could fail. Tubberman wanted to send for help then. The colony voted the motion down.

"Where we were on Bitkim Island, we didn't get much Thread but I heard what it did; wiped out whole Stakes down to the metal they'd been wearing. Ate anything, Thread did, gorged until it blew up too fast to live: but it could burrow down and the next generation would begin. Fire stopped it, and metal. It drowned in water. The fish, even the dolphins, thrived on it, or so the dolphineers said. Humph. Damned stuff only let up a couple of years back. Otherwise, we've had the frigging menace raining down on us every ten days or so for fifty fucking years."

"You did well to survive, Mr. Kimmer," Saraidh said in a flattering purr as she leaned forward to elicit more confidences, "for fifty long years. But how? It must have taken tremendous effort."

"Kenjo'd started 'ponics. Had some sense, that man, even with this fanatic thing he had about flying and being in the air. Space crazy he was. But I was better at contracting the things you need to live. I taught this whole bunch everything I knew—not that they're grateful to me," and his spiteful eyes rested on the three Fusaiyukis. "We saved horses, sheep, cattle, chickens before Thread could ooze all over 'em. I'd salvaged one of the old grass-makers they used the first year, before they'd planted Earth grass and that Altair hybrid got started." He paused, narrowing his eyes. "Tubberman had another type of grass growing before they shunned him. I'd none of that seed but enough to keep us going until we could plant out again. As long as I had power packs, I foraged and saved every scrap I could find. So we survived, and survived real good."

"Then others could live, too?" Saraidh asked mildly.

"NO!" thundered Kimmer, banging the table to emphasize that denial. "No one survived but us. You don't believe me? Tell her, Shensu."

As if making up his mind to obey, Shensu regarded first Kimmer and then the three officers. Then he shrugged.

"After Thread had stopped for three months, Kimmer sent us out to see if anyone lived. We went from the Jordan

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River west to the Great Desert. We did see long overgrown ruins where Stakes had been started. We saw many domestic animals. I was surprised to see how many animals had managed to survive, for we saw much devastation of fertile land. We traveled for eight months. We saw no one human nor any evidence of human endeavor. We returned to our hold." He shot a single challenging look at Kimmer before his expression settled into its mask.

Benden had a stray thought—Kimmer had sent them out, not to search for survivors, but hoping they wouldn't return.

"We're miners, too," Shensu continued unexpectedly. Kimmer sat up, too enraged at the bland disclosure to form words. Shensu smiled at that reaction. "We have mined, ores and gemstones, as soon as we were strong enough to wield pick and shovel. All of us, my half-sisters, and our children, too. He insisted that we be rich enough to pay our way back to civilized worlds."

"You fools! You utter fools! You shouldn't have told them. They'll kill us and take it all. All of it."

"They are Fleet Officers, Kimmer," Shensu said, bowing politely to Benden, Ni Morgana, and the astonished Nev. "Like Admiral Benden," and his eyes slid and held Ross Benden's briefly. "They would not be so basely motivated as to steal our fortunes and abandon us. Their orders are to rescue any survivors."

"You will rescue us, won't you?" Kimmer cried, suddenly a terrified old man. "You *must* take us with you. You must!" and now he embarrassed Benden by beginning to blubber. "You must, you must," he kept on insisting, pulling himself toward Benden to grab his tunic.

"Stev, you will make yourself ill again," Chio said, coming to disentangle the grasping hands from Benden's clothing. Her eyes looked her abject apologies for an old man's weakness and her plea for reassurance. The other women fastened apprehensive eyes on the Fleet party.

"Our orders are to establish contact with the survivors—" Benden began, taking refuge in that protocol.

"Lieutenant," Nev intervened, his face contorted with anxiety, "we'd have a weight problem, taking eleven more aboard the *Erica*."

Kimmer moaned.

"We'll discuss this later, Ensign," Benden said sharply. Trust Nev to be loose-jawed. "It is time to change the watch." He gave Nev a quelling look and gestured for Greene to accompany him. Greene looked disgusted as he fell in behind the chastened ensign, who was flushed as he realized how badly he had erred.

As Kimmer kept on sobbing "you must take me, you must take me," Benden turned to Shensu and his brothers.

"We do have orders to follow, but I assure you that if we find no other survivors to make your continued residence viable, you will either come with us on the *Erica* or another means will be found to rescue you."

"I appreciate your constraints and your devotion to duty," Shensu said, his composure in marked contrast to Kimmer's collapse. He made a slight bow from the hips. "However," and

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his face lightened with the slightest of smiles, "my brothers and I have already searched all the old Stakes without success. Will you not accept our investigations as conclusive?" His dignified entreaty was far harder to ignore than Kimmer's blubbering.

Benden tried to assume a noncommittal pose. "I will certainly take that into consideration, Shensu." He was also trying to calculate just how to accommodate eleven extra bodies on the *Erica*. He'd three-quarters of a tank: if they stripped unessential equipment, would that still give him enough fuel to lift and a reserve if last minute adjustments were needed in the slingshot maneuver? Damn Nev. His orders were for search only; not rescue. One thing was certain, he trusted Shensu far more than he did Kimmer.

"This mission has another goal, Mr. Fusaiyuki," Ni Morgana said, "if, under these trying circumstances, you could find your way clear to assist us?"

"Certainly. If I can," and Shensu executed a second dignified bow to her.

"Would you have any documentation that Thread comes from the stray planet as Mr. Kimmer intimated?" she asked, pointing to the ceiling and the system diagram. "Or was that only a theory?"

"A theory which my father proved to his satisfaction at least, for he flew up into the stratosphere and observed the debris which the stray planet had dislodged from the Oort Cloud and drawn into this part of the system. He had noticed the cloud on their way through the system. I remember him telling me that he would have paid far closer attention had he any idea of the threat it would pose." Shensu's well-formed lips curled in a wry smile. "The EEC report evidently gave the erratic planet only a mention. I have my father's notes."

"I'd like to see them," Saraidh said, her voice edged with excitement. "Bizarre as it is," she said to Benden, "it is plausible and unique. Of course, this erratic planet could be a large asteroid, even a comet. Its orbit is certainly a cometary."

"No," Benden replied, shaking his head, "the EEC report definitely identifies it as a planet, though probably a wanderer drawn into Rukbat's family only recently. It orbits across the ecliptic."

"Our father was too experienced an airman to make a mistake," Jiro spoke for the first time, his voice as impassioned as Shensu's was cold. "He was a trained pilot and observed critically and objectively on those missions. We have notes of thanks from Admiral Benden, Governor Boll, and Captain Keroon, all expressing gratitude for his investigation and his selfless dedication to duty." Jiro shot a contemptuous look at Kimmer who was still sobbing, his face pillowed in his arms while Chio tried to comfort and reassure him. "Our father died to discover such truths."

Saraidh murmured something appropriate. "If you would cooperate, further information about this phenomenon would be invaluable."

"Why?" Shensu asked bluntly. "There can't be other worlds that are infested with this menace, can there?"

"Not that we know of, Mr. Fusaiyuki, but all information is valuable to someone. My orders were to find out more about this organism."

Shensu shrugged. "You're too late

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by several years to do the most valuable observations," he said with a wry note in his voice.

"We saw some . . . " Saraidh fumbled for an exact description of the "tunnels" they had seen at Landing, "remnants, dead shells of these Thread. Would there be any near you that I could examine?"

Shensu shrugged again. "Some on the plains below us."

"How far in terms of time?" Saraidh asked.

"A day's journey."

"Will you guide me?"

"You?" Shensu was surprised.

"Lieutenant Ni Morgana is the science officer of the *Amherst*," Benden put in firmly. "You will want to assist her in this investigation, Mr. Fusaiyuki."

Shensu made a small gesture of obedience with his hands.

"Jiro, Kimo," Chio spoke up. Kimmer seemed to have subsided into sleep. "Help me carry him to his room."

The two men rose, their faces blank of expression and picked him up, much as they would a sack, and carried him toward a curtained arch through which they disappeared, Chio following anxiously.

"I'll check on Nev," Benden said, rising, "while you arrange tomorrow's expedition with Shensu, Commander."

"A good idea, Lieutenant."

Benden motioned for the two marines to remain as he made his way out of the superb room, his eyes on the gorgeous murals and their story of mankind's triumph over tremendous odds.

"I could wish, Ensign Nev, that you would learn to think before you speak," Benden said sternly to the chagrined junior when he returned to the *Erica*.

"I'm real sorry, Lieutenant," and Nev's face was twisted with anxiety, "but we can't just leave them, can we? Not if we can actually rescue them?"

"You've made such calculations?"

"Aye, sir, I did, as soon as I got back on board," and eagerly Nev brought his figures up on the monitor. "Of course, I could only estimate their weight but they can't weigh *that* much and the inward journey only took a quarter of our fuel."

"We've a planet to search, mister," Benden said sharply as he bent to study the figures. This was going to be a command decision on his part: to abandon the search on the basis of the opinion of a few local witnesses or to carry out his original orders scrupulously.

"We weren't expected to *find* survivors, were we?" Nev asked in a tentative voice.

Benden frowned at him. "What exactly do you mean by that, mister?"

"Well, Lieutenant, if Captain Fargoe had *expected* there'd be survivors, wouldn't she have ordered a troop shuttle? They'd carry a couple of hundred people."

Benden regarded Nev with exasperation. "You know our orders as well as I do: to discover the survivors and their present circumstances. Nothing was intimated that we wouldn't find survivors. Or that we wouldn't find them able to continue their colonial effort."

"But this lot couldn't, could they? There aren't enough of them. I don't trust the old man but that Shensu's OK."

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"When I need your opinion, mister, I'll ask for it," Benden said curtly. Nev subsided to glum silence while Benden continued to peer at the numbers on the screen, half-wishing they would cabalistically rearrange themselves into a solution for his dilemma.

"Establish how much we'd need to jettison, mister, without seriously affecting safety during the slingshot. Ascertain just where we can put eleven passengers and take into your weight consideration the extra padding and harness we'd need to secure them during lift-off."

"Aye, aye, sir." Nev's enthusiasm and the admiring look he gave Benden was almost harder to endure than his chastened funk.

Benden strode to the airlock and out of the ship, taking the crisp air into his lungs as if that would aid his thinking. In a sense Nev was right: the captain hadn't expected that they would find survivors in need of rescue. She had assumed that either the settlers had overcome the disaster or that all had succumbed to it. However, these eleven could not, in the name of humanity, be left behind on the planet.

The *Erica*'s remaining fuel would barely accomplish that rescue. It certainly wouldn't allow the Pernese to bring anything back with them to start again elsewhere, like metal ores. Possibly some of those gemstones Shensu had mentioned could be permitted. With no more than the usual shipwreck allowance, these people would be seriously handicapped in the high tech societies on most of the Federation planets, and financially unable to establish themselves in an agrarian economy. They had to have *something*.

If Kimmer could be believed, and possibly with the estranged brothers corroborating his statement, it was true that these eleven constituted all that remained of the original colonial complement, then further search would be fruitless as well as wasting fuel that could, really, be put to better use. Did the brothers have any reason to lie? Not, Benden thought, when they hated Kimmer so much. Ah, but they'd want to leave this place, wouldn't they, even if it meant perjuring themselves!

Unusual noises attracted his attention and he walked to the edge of the plateau to check. Some twenty meters below him he saw four people, Jiro and the three youngest, mounted on Earth-type horses, herding a variety of four-legged domestic beasts through a huge aperture in the cliff. He heard an odd call and saw a brown, winged shape hurtling after them. As he watched, a heavy metal door swung on well oiled hinges to close off the opening. The evening breeze, for the light was beginning to fail now on their first day of their five on this planet, wafted some curious smells up to him. He sneezed as he made his way across the plateau to the door to this unusual residence. They'd have to turn those animals loose. Bloody sure, there was no room on board the *Erica* for that mob.

When Benden reentered the big room, he spotted Ni Morgana and Shensu poring over maps on a smaller table to the left of the main entrance. There were cases of tapes and other paraphernalia along that section of the smooth carved wall.

"Lieutenant, we've got both the orig-

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inal survey maps here and those that the colonists filled in with detailed explorations," Saraidh called to him. "A crying shame this endeavor was so brutally short-lived. They'd a lovely situation here. See," and her scripto touched first one, then another of the shaded areas on the map of the southern continent, "fertile farms producing everything they needed before disaster struck, a viable fishing industry, mines with onsite smelting and manufactory. And then . . . " she gave an eloquent shrug.

"Admiral Benden rose to the challenge magnificently," Shensu said, the glow in his eyes altering his whole appearance, making him a far more likeable person. "He called for centralization of all materials and skills. My father commanded the aerial defense. He had flame-throwers mounted on sleds, two forward and one aft, and developed flight patterns that would cover the largest areas and destroy quantities of airborne Thread. Ground crews were organized with portable flamers to incinerate what did get through to the ground, before it could burrow and reproduce itself. It was the most valiant effort!"

There was an excitement and a ring in Shensu's voice that made Benden's pulse quicken—he could see that Saraidh was also affected. Shensu's whole attitude was suffused with reverence and awe.

"We were just young boys but our father came as often as he could and told us what was happening. He was always in touch with our mother. He even spoke to her just before . . . before that final mission." All the emotion left Shensu and his expression assumed its habitual taciturnity. "He was brutally murdered just when he might have made the discovery which could have ended Threadfall and preserved the whole colony."

"By this Avril person?" Saraidh asked gently.

Shensu nodded once, his features set. "Then *he* came!"

"And now we have come," Saraidh said, pausing a moment before continuing on a brisker note, "and we must somehow gather as much evidence after the fact as possible. There have been many theories about Oort clouds and what they contain. This is the first opportunity to examine such a space-evolved creature, and the disaster it causes on an uninhabited planet. You said the organism burrowed into the ground and reproduced itself? I'd like to see the later stage of the organism's life cycle. Can you show me where?" she asked, looking exceedingly attractive, Benden thought, in her eagerness.

Shensu looked disgusted. "You wouldn't want to see any stage in its life cycle. My mother said that there was only the hunger of it. Which no one should encounter."

"Any sort of residue would aid the research, Shensu," she said, reaching out to touch his arm. "We need your help, Shensu."

"We needed yours a long time ago," he said in a voice so bitter that Saraidh withdrew her hand, flushing.

"This expedition was mounted as soon as your message came up on the records, Shensu. The delay is not ours," Benden replied crisply. "But we are here and we'd like your cooperation."

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Shensu gave a cynical snort. "Does my cooperation guarantee escaping from this place?"

Benden looked him squarely in the eye. "I could not, in conscience, leave you here," he said, having in that moment made his decision, "especially in view of the fact that I also cannot assure you that you would be relieved by another vessel in the near future. I shall, however, need to have the exact body weights of everyone and frankly we'll have to strip the *Erica* to accommodate you."

Shensu kept eye contact, his own reaction to Benden's decision unreadable. Benden was aware of Ni Morgana's discreet approval. "Your ship is low on fuel?"

"If we are to successfully lift additional passengers, yes."

"If you did not have to strip the *Erica* to compensate for our weight?" Shensu seemed amused as he watched Benden's reaction. "If you had, say, a full tank, could you allow us to bring enough valuables to assist us to resettle somewhere? Rescue to a pauper's existence would be no rescue at all."

Benden nodded in acknowledgement of that fact even as he spoke. "Kimmer said there was no more fuel. He was emphatic about it."

Shensu leaned his body across the table and spoke in a scarcely audible whisper, his black eyes glittering with what Benden read as quiet satisfaction. "Kimmer doesn't know everything, Lieutenant," and now Shensu chuckled, "he thinks he does."

"What do you know that Kimmer doesn't?" Benden asked, lowering his own voice.

"Spaceship fuel has not changed in the past six decades, has it?" Shensu asked in his whisper.

"Not for ships of the *Amherst*'s and the *Erica*'s class," Saraidh replied, quietly eager.

"Since you're interested," Shensu said in a conversational voice level as he rose from the table, "I'd be happy to show you the rest of the Hold. We have a place for everything. I think my esteemed father had visions of founding a dynasty. My mother said that had not Thread come, there were others of our ethnic type who would have joined them here in Honshu." Shensu lead them towards a hanging which he pushed aside, gesturing them to proceed through the archway. "They accomplished much before Thread fell."

He let the hanging fall and joined Saraidh and Benden on the small square landing where stone-cut steps spiraled in both directions. Shensu gestured that they were to ascend.

Saraidh started up. "Wow! This is some staircase," she said, as she made the first turn.

"I must warn you that the living room has peculiarities—one of which is an echo effect," Shensu said. "Conversations can be overheard in the passages outside. I don't believe *he* has yet recovered from his . . . disability . . . but Chio, or one of his daughters, is always eavesdropping for him. So, I take no chances. No, continue up. I know the steps become uneven. Balance yourself against the wall."

The steps were uneven, unfinished, and several had no more than toe space.

"This was deliberate?" asked Saraidh, beginning to show the effort of the

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climbing. "Oh, for a grav shaft!"

Benden was in agreement as he felt the muscles in his calves and thighs tightening. And he had thought that he'd spent adequate time in P.T. to keep himself fit for any exertion.

"Now where?" Saraidh asked as she came to a very narrow landing. The thin slit of a tiny apperture did nothing to illuminate the blank walls all around them.

Shensu apologized as he squeezed past the two officers, the half smile still on his face and, to their chagrin, he was showing no signs of effort. He put his hand, palm down, on a rough, apparently natural, declivity in the wall and suddenly a whole section of the wall pivoted inward. Light came on to illuminate a low deep cave. Benden whistled in surprise because the space was full of sacks, each tagged with some sort of coded label. Sacks of fuel, row upon row of them.

"There's more here than we need," Saraidh said, having made some rough calculations. "More than enough. But . . . " and now she turned to Shensu, her expression stern, "I could understand your keeping this from Kimmer but surely this was fuel those shuttles could have used? Or did they?" For she had also noticed that some of the closer ranks were thinned where sacks had obviously been removed.

Shensu held up his hand. "My father was an honorable man. And when the need arose, he took what was needed from this cavern and gave it, willingly, to Admiral Benden, doing all within his power to help overcome the menace that dropped from the skies. If he had not been murdered . . . " Shensu broke off the sentence, his jaw muscles tensing, his expression bleak. "I do not know where the three shuttles went, but they could only have lifted from Landing on the fuel my father gave Admiral Benden. Now I give the rest of the fuel to a man also named Benden." Shensu looked pointedly at the lieutenant.

"Paul Benden was my uncle," he admitted, finding himself chagrined at this unexpected inheritance. "The *Erica* is also economical with fuel. With a full tank, we can lift you and even make some allowance for personal effects. But why is the fuel *here?*"

"My father did not steal it," Shensu said, indignant.

"And I didn't imply that he had, Shensu," Benden replied soothingly.

"My father accumulated this fuel during the transfer from the colony ships to the surface of the planet. He was the most accomplished shuttle pilot of them all. And he was the most economical. He only took what his careful flying saved on each flight and no one took harm from his economy. He told me how much was wasted by the other pilots, carelessly wasted. He was a charterer and had the right to take what was available. He merely ensured that fuel was available."

"But—" Benden began, wishing to reassure Shensu.

"He saved it to fly. He had to fly," and Shensu's eyes became slightly unfocused as his impassioned explanation continued. "It was his life. With space denied him, he designed a little atmosphere plane. I can show it to you. He flew it here, in Honshu, where no one but us could see him. But he took each of us in that plane." Shensu's face soft-

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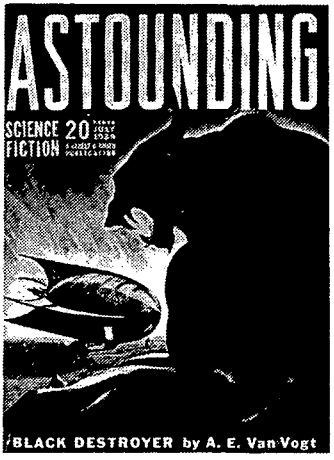

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ened with these memories. "That was the prize we all worked for. And I could understand his fascination with flight." Shensu took in a deep breath and regarded the two Fleet officers in his usual inscrutable fashion.

"I'm not sure I could live happily stuck landside forever," Benden said earnestly. "And we're grateful to be taken into your confidence, Shensu."

"My father would be pleased that his saving ways permit a Benden to save his kinsmen," Shensu said in a wry tone and with a sly glance at the lieutenant. "But we will wait until late tonight, when there are few to notice our activity. Those marines of yours look strong. But do not bring that ensign. He talks too much. I do not want Kimmer to know of our transaction. It is enough that he will be rescued from Pern."

"Have you checked these sacks recently, Shensu?" Saraidh asked and, when he shook his head, she had to crouch to enter the low cave and inspect the nearest. "Your father did well, Shensu," she said over her shoulder, peering at the sack she had tilted upside down. "I was afraid there might be some contamination from the plastic after fifty-odd years but the fuel all seems to be clear, no sediment, well saved."

"What gemstones would be worth bringing with us?" Shensu asked casually.

"Industrial technology requires quantities of sapphire, pure quartz, diamonds," Saraidh told him as she left the cave, arching her back to relieve the strain of crouching. "But the major use of natural gemstones is once again decorative—for pets, high-status women, courtly men."

"Black diamonds?" Shensu asked, his lips parting in anticipation.

"Black diamonds?" Saraidh was astonished.

"Come, I will show you," Shensu said, allowing his lips to part in a pleased smile. "First we will close the cave and then descend to our workshops. Then I will show you the rest of the Hold as I said I would do," and he grinned back at them.

Benden was not sure whether going down was worse than climbing. He felt not only dizzy from the short arc of the stairs but had the sensations that he would fall forward down this interminable spiral. He considered himself competent in free fall or in space walking but this was a subtly different activity. He was only marginally relieved that Shensu was in front of him but, if Saraidh fell into *him,* was Shensu sturdy enough to keep all three from pitching down?

They passed several landings which Shensu ignored, and seemed to descend a very long way before they emerged into another large room which must be under the main living chamber. It was not as high-ceilinged or as well finished but it was clearly furnished for a variety of activities. He identified a large kiln, a forge hearth and three looms. Work tables were placed near racks of carefully stored tools. Hand tools, not a power tool among them.

Shensu led them to a plastic cabinet a meter high and wide with many small drawers. He pulled out two, evidently at random, and scattered their contents on the nearby table, the facets of the cut stones sparkling in the overhead light.

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Saraidh exclaimed in surprise, scooping up a handful of carelessly thrown stones of all sizes. Benden picked up a large one out of her hand, holding it up to the light. He's never seen anything like it, dark but glittering with light.

"Black diamond. There's a whole beach full of them below a dead volcano." Shensu said, leaning back against the table, arms folded across his chest. His smile was amused. "We have drawers of them, and emeralds, sapphires, rubies. We're all good lapidaries though Faith is cleverest in cutting. We don't bother much with what Kimmer terms semi-precious though he has some fine turquoise which he says is extremely valuable."

"Probably," Saraidh murmured, still absorbed in running a shower of the diamonds through her hands. She was absorbed but not, Benden noted, covetous.

"The blacks are why I know you won't find any survivors in the north," Shensu went on, his eyes on Benden, who was less involved in the gemstones.

"Oh? Why?"

"Before the sled power packs died, Kimmer made two trips to Bitkim Island where he and Avril Bitra had mined both the black diamonds and emeralds. He brought me and Jiro with him both times to help gather the rough diamonds. I saw him leave our camp late one night and I followed him. He went into a big water cavern before he disappeared from sight. He had the light. I didn't dare go further. But, in the cavern lagoon three ships were moored, masts lashed to the decks. They were plastic hulled and their decks were badly scored by Thread. It couldn't pierce plastic but it could melt grooves on it. I went down into one of the ships and everything was neatly stowed aboard, even in the galley there were supplies in tight containers. Everything left in readiness for the ships to be sailed out of the cavern again." Shensu paused dramatically. Shensu had a feeling for the dramatic, Benden realized. But that was not a fault. "Three years later, we came back for a last load. And no one had been near the ships. There was a thick coat of dust on everything. Nothing had been touched. Except there was a lot more algae on the hulls and wind-blown debris on the decks. Three years! I say there was no one left to sail them."

Saraidh had let the diamonds drip through her fingers to the table and now she sighed. "You said there was a volcanic island? Was it active when you were there? That could account for that heat source we noticed," she added to Benden.

"Kimmer would stretch the truth every which way," Shensu said, "to make himself look good. But he desperately wanted to have a larger gene pool—for his own pleasure if not ours." The last was said with an understandable malice. "If only a few more had survived, there'd be that much more future for all of us."

That gave both Ross Benden and Saraidh Ni Morgana a lot to mull over as Shensu showed them round the additional facilities: the animal barn, the well-supplied storage areas. He paused at a locked door to a lower level.

"Kimmer keeps the key to the hangar, so I can't show you my father's

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plane," Shensu said. Then he gestured for them to ascend the stairs to the upper floors. Benden was relieved that these steps were wide and straight.

When they returned to the main level of Honshu Hold, they found the women busily preparing a feast: certainly a feast for those who had been five years on a mission. Not that the *Amherst* did not cater well but nothing to compare with spit-roasted lamb and the variety of Pernese hybrid vegetables and tubers. The two marines who stayed aboard, despite the slightly sarcastic assurance from Kimmer that no enemies could be lurking on Honshu Cliff, were brought heaping platters and non-fermented beverages by Faith and Charity. Within the Hold, the evening was merry and Kimmer, with a glass or two of wine, became expansive as a host. For he had recovered his composure after a long rest, and tactfully, no mention was made of his collapse.

As prearranged, Benden, Sergeant Greene, and Vartry met Shensu, his two brothers and the boys, Alun and Pat. Even with nine to tote sacks, it took four trips to top off the *Erica*'s tanks. The boys were short enough to walk upright in the low cave and they brought the sacks out to those who waited to haul them down. The marines were not above showing off their fitness and, using slings, carried eight sacks at a time. Ross Benden decided that four were quite enough and he had no reason to challenge the marines. The Fusaiyuki brothers carried six effortlessly. When the tanks were full, there were still sacks in the cavern.

The next morning, hearing Nev's cheerful morning ablutions, Ross Benden stirred and abruptly stopped. He was uncomfortably stiff and sore from the night's exertions.

"Something wrong, sir?"

"Not a thing," Benden said. "Just finish up and let me have a chance, will you?"

Nev took that in good part and shortly was out of the tiny cabin. Moving with extreme caution, and hissing at the pain of abused muscles, Ross Benden managed to get to his feet. Bent-kneed, he hobbled to the hand basin and opened the small cabinet above that contained the medical kit. A thorough search revealed nothing for muscular aches. He fumbled for a pain tablet, knocked it to the back of his mouth, and discovered that his neck was sore too. He took a drink of water. He must remember to drain the cistern and fill it with the excellent water of Pern.

A scratch at the door made Benden straighten up, despite the anguish to the long tendons in his legs, but he was damned if he'd show weakness.

"It's I," and Ni Morgana entered, taking in at a glance his semi-crippled state. "I thought this likely. Just one trip up and down those racks of a stair and my legs were sore. Faith gave me this salve . . . wanted me to test it to see if it was something of medical value. It's indigenous . . . no, lie back down, Ross, I'll slather it on. Supposed to have numbing properties. Hmm, it does," and she eyed her fingers and the generous dollop she had scooped out of the jar.

Ross was crippled enough to be willing to try anything, noxious or bizarre. He could hardly appear before Kimmer in his present shape.

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"Oh, it is numbing. Whee, ooh, ahh, more on the right calf, please," Benden said, ridiculously relieved by the numbing effect of the salve. The pain seemed to drain out of calves and thighs, leaving them oddly cool but not cold, and certainly free of that damnable soreness.

"I've got plenty for later and Faith says they have buckets of the stuff. Make it fresh every year. Doesn't smell half bad either. Pungent and . . . piney."

When she finished doctoring Benden, she washed her hands thoroughly. "I'd say don't shower today or you'll lose the relief." Then she turned back to Ross Benden, with a puzzled expression. "Ross," she began, settling against the little hand basin and crossing her arms. "How much would you say Kimmer weighed?"

"Hmm," and Benden thought of the man's build and height, "about 72–74 kilos. Why?"

"I weighed him in at 95 kilos. Of course, he was clothed, and the tunic and trousers are rather full and made of sturdy fabric, but I wouldn't have thought he carried that much flesh."

"Nor would I."

"I didn't judge the women correctly either. They all weighed in a little under and a little over 70 kilos and none of them are either tall or heavy-set."

Nev mumbled figures under his breath. "All of 'em, even the kids?"

"No, the three brothers are 73, 72, and 75 kilos, which is about what I thought they'd be. The girl and the boys are also 2 or 3 kilos more than I'd have thought them."

"With a full tank, we can afford a few extra kilos," Benden said.

"I was also asked how much they could bring with them," Saraidh went on, "and I said we had to calibrate body weights and other factors before we could give them an exact allowance. I trust that wasn't out of line."

"I'll get Nev to calculate in those weights and let me know how much fuel we'll have in reserve then," Benden said. "And what we use as padding and safety harness so no one bounces all over the gig during take-off."

Folding out the cabin's keyboard, Benden ran some rough figures against the lifting power of the now full tank. "D'you have a total of their weights?" Ni Morgana gave him the figures. He added them in plus kilos for padding and harness and contemplated the result. "I'd hate to be considered mean but 23.5 kilos each is about all we can allow."

"That's as much as we're allowed for personal effects on the *Amherst*," Ni Morgana said. "Is there room for 23.5 kilos in medicinals? I gather this stuff is effective."

"It certainly is," Benden said, flexing his knees and feeling no discomfort.

"I'll just get some of this on the marines as well, then," Ni Morgana said.

"Ha!" was Benden's scoffing reply.

"I don't know about that," Ni Morgana said with a sly grin. "But then, you didn't catch sight of Sergeant Greene making for the galley. I think," and she paused reflectively, "that I'm doing some empirical tests of this junk and they just got lucky to be chosen as test subjects. Yes, that should save face admirably. We can't give Kimmer any

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reason to be suspicious, now, can we?" Then she left, chuckling over her subterfuge.

At 0835, when Benden left the galley and proceeded to the Hold, he found Kimmer and the women in the main room, none of them looking too happy.

"We've done the calculations, Kimmer, and we can allow each of you, the children included, 23.5 kilos of personal effects. That's what Fleet personnel are generally allowed to bring on voyages and I can't see Captain Fargoe objecting to it."

"Twenty-three point five kilos is quite generous, Lieutenant," Kimmer surprised Benden by saying. He turned to them chidingly "That's more than we had coming out on the *Yoko*."

"And," Benden said, turning to Faith, "that wouldn't include medicinal products and respective seeds to a similar limit. Lieutenant Ni Morgana is of the opinion that they could well be valuable commodities."

"For which we'd be reimbursed?" asked Kimmer sharply.

"Of course," Benden said, keeping his voice even. "We have to allow for the weight of padding and harness to keep you secure during our drop into the gravity well. . . ."

Charity and Hope emitted nervous squeaks.

"Nothing to worry yourself over, ladies," Benden went on with a reassuring smile. "We use gravity wells all the time as a quick way to break out of a system."

"Be damned grateful we're getting off this frigging forsaken mudball," Kimmer said, angrily rising to his feet. "Go on, now, sort out what you've got to bring but keep it to the weight limit. Hear me?"

The women removed themselves, with Faith casting one last despairing glance over her shoulder at her father. Benden wondered why he had thought any of them were graceful. They waddled in a most ungainly fashion.

"You've been extremely generous, Lieutenant," Kimmer said affably, as he settled himself again in the high-backed carved chair that he usually occupied at the table. "I thought we'd be lucky enough to get off with what we have on our backs."

"Are you absolutely positive that there are no other survivors on Pern?" Benden said, favoring a direct attack. "Others could have carved holds out of cliffs and remained secure from that airborne menace of yours."

"Yes, they could have but, for one thing, there aren't any cave systems here on the southern continent. And I'll tell you why I think the rest perished after I lost the last radio contact with those at Drake's Lake and Dorado. In those days I was more confident of rescue. And I'd enough power left in my sled to make one more trip back to Bitkim Island where I'd mined some good emeralds." He paused, leaning forward, elbows on the table and shaking one finger at Benden. "And black diamonds."

"*Black* diamonds?" And Benden thought he sounded genuinely amazed.

"Black diamonds, a whole beach full of them. That's what I intend to bring back."

"Twenty-three point five kilos of them?"

"And a few pieces of turquoise that

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I also found."

"Really?"

"When I'd enough of a load of stones, I went into a natural cavern on Bitkim's southeast side. Big enough to anchor ships in if you stepped the mast. And it was there."

"Pardon?"

"Jim Tillek's ship was there, mast and all, holes and grooves where Thread had scored it time and again."

"Jim Tillek?"

"The admiral's right hand. And a man who loved that ship. Loved it like other men love women . . . or Fussy Fusi loved flying," Kimmer allowed his malice to show briefly, "but I'm telling you, Jim Tillek wouldn't have left that ship, not to gather dust and algae on her hull, if he was alive somewhere on Pern. And that ship had been anchored there three or four years. That's one very good reason why I know no one was left alive."

"Did you find any sign of human occupation," Kimmer went on, his voice less intense, his eyes glittering almost mockingly, "when you spiraled down across the northern hemisphere?"

"No, neither on infra or power-use detection," Benden had to admit.

Kimmer spread both arms wide then. "You know there's no one there, then. No need to waste your reserves of fuel to find 'em. We're the last alive on Pern and, I'll tell you this, it's no planet for mankind."

"I'm sure the Colonial Authority will want a full report from you when you return to Base, Kimmer. I shall certainly log in my findings."

"Then do mankind a favor, Lieutenant, and tag this disaster of a world as uninhabitable."

"That's not for me to say."

Kimmer snorted and sat back in his chair.

"Now, if you'll excuse me, I must join Lieutenant Ni Morgana on her scientific survey. There are sufficient liftbelts, if you'd like to come along."

"No, thank you, Lieutenant," and Kimmer flicked his hand in dismissal of such activity. "I've seen about as much of this planet as I have any wish to."

Benden was just strapping on his liftbelt when Kimmer erupted from the Hold, the whites of his eyes showing in his agitation.

"Lieutenant!" he cried, running towards the small party.

Benden held up a warning hand as one of the marines beside him moved to intercept the man.

"Lieutenant, what power do you use for the belts? What power?" Kimmer cried excitedly as he approached.

"Pack power, of course," Benden replied.

"Regulation packs?" And, without apology, Kimmer grabbed the lieutenant by the shoulder and swung him around, just as Vartry took hold of the old man's arm.

"As you were!" Ross Benden barked at the marine but with a nod to reassure him, because he understood what Kimmer, in his excitement, did not explain. "Yes, standard power packs, and we have enough to reactivate that sled of yours, if it's in any reasonable working order."

"It is, Lieutenant, it is!" Kimmer reassured him, his agitation replaced by immense satisfaction. "So you'll be able to eyeball the remains of the colony

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and report honestly to your captain that you followed your orders, Mister Benden," and Kimmer stressed the name in a tone just short of malice, "as assiduously as your noble relative would have done." Ross grimaced, but his relation to the admiral would have become public sooner or later. "I thought you looked familiar," Kimmer added, smugly.

Benden took the lieutenant aside for a quick conference and she concurred that it was Benden's first obligation to search as far as he was able for survivors. She was quite willing to conduct her own scientific research with Shensu as her guide and two marines as assistants. So she wished the lieutenant good luck and lifted gracefully off the plateau, floating down in the direction of the nearest evidence of Thread, some ten klicks down the valley on the other side of the river.

That matter settled, Kimmer began to pluck at Benden's sleeve in his urgency and hurried him, Nev following, back into the Hold. Maps were still spread out on the table from the previous evening.

"I searched east as far as Landing and Cardiff," Kimmer said, prodding one map with an arthritic index finger. He dragged it back and down along to the Jordan River. "Those Stakes were all empty and Thread-ridden through Calusa, Ted Tubberman's old place wasn't." Kimmer frowned a moment, then shrugged off that enigma, moving his finger up to the coastline and west. "Paradise River must have been used as some kind of staging area because there were netted containers in the overgrowth along the shore but the buildings were all boarded up. Malay, too, and Boca," he stabbed again at those points on the map. "I went north from Boca to Bitkim but I confess that I didn't stop at Thessaly or Roma, where they had well-built stone houses and barns. And I didn't get any further west. The gauge on the power pack was jiggling too much for me to risk getting stranded."

"So there could be survivors to the west. . . ." Benden pored over the map, feeling a surge of excitement and hope. Then he wondered why Kimmer was willing to take such a risk—that enough survivors would be found for the colony to be left to work out its parochial problems. Maybe the prospect of leaving so much behind, including being the default owner of a planet, was giving Kimmer second thoughts. If fifty years of his life's endeavors was going to be crammed into a 23.5 kilo sack, living out the remainder of his life in the comforts he had achieved might indeed hold more charm for the old man than an uncertain, and possibly, pauper's existence in a linear warren.

"There could indeed be Stakeholders there, but why haven't they attempted any contact?" Kimmer asked defiantly, and his eyes quickly concealed a flicker of something else. "I got the last communication from the west but that could have been for any number of reasons. Now, if you've got a portable unit that we could bring with us, maybe closer to one of the western Stakes, we might rouse someone."

"Let's see this sled of yours," Benden didn't mention that they had opened the broadest range of communications on their inbound spiral with not so much as a flicker on any frequency. But Kim-

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mer was right that lack of communication could have been caused by any number of reasons.

Kimmer led them to the locked door, which he opened, and proceeded down to the next level, a hangar in fact, with wide double doors at one end which opened out on the wide terrace below the Hold entrance plateau. While the sled occupied the center of the considerable floor space, Kenjo's little atmosphere underwing craft was not quite hidden in the back. Then Benden's attention was all for the sled, which was cocooned in the usual durable thin plastic film. This Kimmer energetically punctured. All four men helped peel the sled free as Kimmer enumerated his exact shut-down precautions. Although the plascanopy was somewhat darkened with age and the tracks of Thread hits, when Benden touched the release button, the door slid back as easily as if it had been opened the day before.

This was a much older model than those now in use, of course, so Benden did a thorough inspection; but the fabric of the sturdy vessel was undamaged. The control panel was one he recognized from text-tapes. When he depressed the power toggle, the gauge above it fluttered and then dropped back to zero. He walked aft to the power locker, flipped up the latches on the power trunk, and lifted the big unit out to examine the leads. Liftbelts used much smaller packs, but Benden could see no difficulty in making a multiple connection of smaller units to supply power. Moving forward again, Kimmer stepping out of his way but exuding a palpable excitement, Benden tested the steering yoke, which moved easily in his grip.

"We'll just make a link-up and see how she answers to power. Ensign Nev, take Kimo and Jiro and break out twelve belt packs, and the portable comunit. We're going to take a little ride."

An hour later, once more operational, the old sled drifted under its own power to the narrower lower terrace.

When Benden returned to the *Erica* for rations and a bedroll, an earnest and anxious Nev accosted him, wanting to join the expedition.

"You don't know what that old man might try, Lieutenant. And I don't trust him."

"Listen up," Benden said in a low and forceful tone that stopped Nev's babbling. "I'm not half as worried about my safety as I am about the *Erica*'s. Kimmer goes with me. I don't trust him either. I'll take Jiro along as well. And Sergeant Greene. Neither of them could get through Greene to me. You'll only have Kimo to worry about and he strikes me as too placid to do anything on his own. Shensu is a proven ally. Present my compliments to Lieutenant Ni Morgana when she returns and relay this order. Either you or the lieutenant are to be on the *Erica* at all times. The marines are to stand proper watches until I return. Have I made that clear?"

"Aye, aye, sir, Lieutenant Benden. Loud and clear, sir." Nev's teeth were almost chattering with his assurances and his eyes were wide as he dutifully assimilated his orders.

"I'll report in at intervals so break out hand-units for yourself and Vartry."

"Aye, aye, sir."

"We'll be back in two days." He

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ordered Greene to collect supplies and carry them to the sled.

"If you will pardon me, Lieutenant," Kimmer said unctuously as he and Jiro entered the craft, "I think we can easily reach Karachi Camp today, stopping at Suweto and Yukon on the way. Karachi is a real possibility because, now that Thread is gone, they'd want to activate the mines."

Surprising himself, Benden gestured with an open hand to the pilot's seat. "You have the con, Mr. Kimmer." It was as good a way as any to see just how competent the old man had been: if he had actually done what he said he did, "After all, you're more familiar with this model sled than I am and you know where we're going." It would also be easier to keep the old man occupied.

So Benden seated himself behind Kimmer while the sergeant, giving the officer only a mildly reproachful look, took the seat next to Jiro on the starboard side.

The old sled purred along as if delighted by its release from long imprisonment. It answered the yoke with the smoothness of a well-maintained vehicle as Kimmer swung it to port. Kimmer wasn't all bad, Benden thought of himself, and wondered again why the old man had insisted on this search. Was it really to prove to Benden that his folk were the only ones left? Or had Kimmer some ulterior motive? And would Kimmer be surprised if they did find anyone? After overflying the snowy waste of the northern continent and the devastation of the southern lands, Benden could only be surprised that anyone had survived. It was certainly most unlikely that his uncle, who'd be well into his twelfth decade, would still be alive.

They came down from the foothills across the river, obliquely to port of Ni Morgana and her group, and then across a lifeless plain of circles in the dust. There were spots here and there of struggling plant life, but Benden wondered if the wind would scatter the topsoil before vegetation could reestablish itself and prevent further erosion. And that was the pattern for the next few hours—broad uneven-edged ribbons, about fifty klicks across of ravaged land—then broader belts of grassland or forest, even thick vegetation neither shrub or jungle, with the glint of hidden water in rivers and ponds.

The old sled purred along at about 220 klicks per hour. Benden broke out rations and passed them around. Kimmer altered the course and, over the sloping nose of the sled, a large and brilliantly blue lake could be seen. As they neared it and Kimmer obligingly skimmed low, vegetation-crowned mounds indicated the ruins of a considerable settlement.

"Drake's Lake," and Kimmer gave a sour laugh. "Damned arrogant fool," he muttered to himself. "No signs of anyone but there may be at Andiyar's mines."

They overflew more deserted housing and startled a herd of grazing animals who plunged wildly away from the muted sound of the sled.

"Livestock seems to have survived," Benden remarked. "Will you turn yours loose?"

"What else?" and Kimmer barked a laugh. "Though Chio's moaning about her pet fire-dragon having to be left

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behind."

"Fire-dragon?" Benden asked in surprise.

"Well, that's what some people thought they looked like," Kimmer explained diffidently. "They look like reptiles, lizards to me. It's an indigenous life-form, hatches from eggs, and if you get one then, it attaches itself to you. Useless thing as far as I can see but Chio's fond of it." He glanced over his shoulder at Benden.

"It wouldn't take up much room," Jiro said, speaking for the first time. "It's a bronze male."

Benden shook his head. "Humans, yes, creatures, no," he said firmly. The captain was still likely to question his foisting eleven human survivors on her but she'd blow her tubes if he tried to impose an alien *pet*.

They reached the mine site and landed near the adits. Within was cocooned equipment—ore carts, picks, shovels, all kinds of hand tools, as well as an array of tough plas props for tunnel supports.

"You really had gone back to the lowest level of useful technology, hadn't you?" Benden said, hefting one of the picks. "But if you had stone cutters, didn't you—"

"When that damned Thread started falling, your uncle called in all power packs for use in the sleds. That was Benden's priority and we couldn't fight it."

The living quarters, unlike those at the lake, had been cocooned. Peering in through the thinner patches over windows, Benden could see that furnishings had been left in place.

"See what I mean, Lieutenant? This place is all ready to be started up again. It's nearly two years since Thread stopped falling. If they could, they'd be back here."

They spent the night there at Karachi, setting up a rough camp. While Kimmer started a fire, "to keep the tunnel snakes away" he told Benden, the lieutenant made contact with Honshu and spoke to Nev, who said the lieutenant was writing up her notes and that nothing of any significance had happened.

Just as Benden was signing off, Jiro came to the sled for a coil of rope and walked off into the forest. He returned not too much later with a fat squat avian which he had roped off a branch and strangled. He identified it as a wherry, as he neatly skinned and spitted it over the fire. During its roasting, the aroma of the meat was tantalizing, arousing a good appetite. It proved to be very tasty.

"Forest wherries are better than coastal ones," Kimmer said, slicing himself another portion. "Those have an oily, fishy taste."

Greene nodded appreciatively as he licked his fingers clean of the juices. Then he excused himself and disappeared into the woods. Just about the time Benden was becoming apprehensive about his long absence, he reappeared.

"Nothing moving anywhere, except things that slither," he reported to the lieutenant in a low voice. "I don't think we *need* to set a watch, Lieutenant, but I always sleep light."

As Benden saw Kimmer already asleep and Jiro settling down on their side of the fire, he decided a watch would be superfluous tonight. The ene-

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mies of this deserted world had retreated into space.

"I sleep light, too, Greene." And he did, rousing often during the night at slight unaccustomed sounds, Kimmer's intermittent snores or when Jiro added more wood to the fire.

In the morning, Benden contacted Honshu and this time spoke with Ni Morgana, who said that her expedition had been entirely successful from the scientific point of view. She would spend the day cataloguing the medicinal plants and their properties with the women. Benden gave her the day's flight plan and signed off.

They doubled back east and slightly north of the mining site and Drake's Lake, then followed a fairly wide river as it flowed down to the distant sea. And came upon the stout stone houses and barns that had housed the inhabitants of Thessaly and Roma. They observed herds of beasts, cattle, and sheep in nearby fields, but the houses and barns had been cleared of all effects. Now just dead leaves and other debris littered the spacious rooms where the shutters had fallen from rusted hinges.

"Lieutenant," and Greene motioned for him to step a little away from the other two men, "we haven't seen any of the sleds Kimmer said they used. Nor those three missing shuttles. So, if we find them, wouldn't we find the people?"

"We would, if we could, Sergeant," Benden said tiredly. "Kimmer, how long did your sled have power?"

Kimmer's eyes gleamed as he appreciated what Benden did not ask. "Once I reached Honshu, I didn't use the sled at all, except as a power source for the comunit, for maybe five, six years. Ito got very sick and I went to Landing to see if I could get a medic out here. They'd all left and taken everything with them. I tried some other Stakes, as I told you, but they were deserted too. Ito died and I was too busy with the kids, and then Chio's, to go off. Then I made one trip to Bitkim and four years later, as I'd no way to recharge the pack, I made that last trip. But," and he held up his gnarled finger, "like I told you, just before I lost all contact, I heard part of Benden's message to conserve all power. So they couldn't have had many operational sleds. I *think*," and here Kimmer paused to search his memory. His eyes met the lieutenant's. "I think they didn't have enough power left to go after Thread anymore and they were going to have to wait." He sighed. "That'd be forty years they'd've had to wait for the end of Thread, Lieutenant, and I don't think they made it."

"Yes, but where *were* they?"

Kimmer shrugged. "Hell, Lieutenant, if I knew that I'd've hiked across the continent to find them once Thread stopped. If I'd had one whisper, I'd've tracked it down." He swiveled about then, facing west. "They were someplace in the west from the direction of their signals. Say," and his face lit up suddenly, "maybe they went to Ierne Island. That would have been easier to protect than one of these open Stakes."

So Benden called in the next destination. "We'll be back by tomorrow evening. . . "

"You'd better be," Ni Morgana said drily. "That window won't wait for anyone."

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There was no question in Benden's mind that the lieutenant would delay taking that window either but he wasn't worried about that. He had to be sure—and it looked as if Kimmer's conscience required him also to be confident that there was no one else alive of Benden's group.

The run to Ierne Island took most of the rest of that day and was as fruitless as the other. Kimmer suggested one further detour, to the tip of Dorado province, to Seminole and Key Largo Stakes. On the wreckage of a storm-damaged building, they found a commast, or sections of it, and evidence of a hurried departure of the inhabitants. In another shed, still partly roofed, the remains of two sleds were discovered, obviously broken up to provide spare parts. The canopies and hulls were well scored and blistered by Thread. Benden appreciated that Kimmer was extraordinarily lucky to have survived at all.

They made their evening camp there with Jiro providing fish which he caught from the remains of a sturdy jetty. The last ten meters, projecting out into the channel, had been snapped off by some tremendous storm, or maybe many. It took a lot of force to break off heavy duty plastic pilings like that.

When Ross Benden checked in with the *Erica*, he roused a sleepy Nev, forgetting that there was a time difference across the southern continent.

"Everything's OK," Nev said, interrupting himself with a yawn, "though the lieutenant is sure something's up. She says the women are acting funny."

"They're about to leave all they've known as well as a very comfortable life," Benden replied.

"Isn't that. Lieutenant'll tell you when you get back." Nev didn't seem much concerned but Benden trusted the lieutenant's instincts.

He was wakeful that night, trying to figure out what *could* have gone wrong. Kimmer was with him. Shensu was eager to leave, too. And with five to guard the *Erica*, which was Benden's main concern, what could go wrong?

He worried about that all the way back to Honshu which was a useless activity. But he'd noticed that those who anticipated problems always seemed able to solve them faster.

When they finally reached Honshu, despite the gathering dusk, Kimmer insisted on maneuvering the sled into its garage, proving his piloting skills.

"This sled's done more than its designers ever expected, Benden," Kimmer said sardonically as he reversed it in, "so humor an old man in rewarding its service the only way he can."

Benden and Greene left him and Jiro to a ritualistic deservicing. Benden ran up the stairs to the main room. Ni Morgana was there, storing small packages in a case. Benden noticed first that some of the wall hangings were missing and then that the big room appeared to be stripped. Damn it! They only had 23.5 kilos each.

"Glad to have you back, Ross," Ni Morgana said, smiling a welcome. "We're just about packed up and ready to go." There was nothing in her manner to suggest anxiety. "There you are, Charity. If you'll stow that in the galley locker, that's the last." She consulted her notepad then, reading the last entry as Charity left with the container. "From your less than jubilant manner,

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Lieutenant, I gather that your time was wasted."

"You could gather that, Saraidh," Benden said, trying not to sound truculent. "In some places material was neatly stored as if the owners intended to return; in others, everything had been left open to the weather, or showed signs of hurried departure. They turned their animals loose and those have multiplied so I'd say that the meek have inherited this planet. You said you'd had more success?"

She reviewed her notepad a moment longer, then flipped it shut and placed it in a hip pocket. A nod of her head and both officers moved toward the door. Benden was relieved to see one of the marines on duty at the ramp of the *Erica,* having a word with Charity before she entered.

"When I've written up my investigations," she said with considerable satisfaction, "there's going to be some red faces. Irrefutably, the Oort cloud supports a life form which I have observed in its normal immensely sluggish metabolic, activated and defunct states. Fascinating actually, even if it also has managed to devastate a world and ruin it for further human habitation. . . ." Ni Morgana walked Benden to the far side of the *Erica,* raising her arm as if to point something out to him. "I don't know *what's* going on but something is, Ross. I don't believe it's just sorrow for leaving their home that's making the women nervous, jumpy, and accounts for a mass insomnia. The children seem fine and Shensu and Kimo have been most helpful."

"I thought taking Kimmer and Jiro with me was a sensible precaution."

"Sensible, but Kimmer's quite likely to have given those women orders before he left. I think he did. I just don't know what. We haven't left the *Erica* unattended but each of us who's stood a watch on her has been plagued with headaches. I'll admit to you, Ross, that I fell asleep on watch. I can't have dozed for more than ten to twenty minutes but I *was* asleep. I can't get Cahill, Nev or the other marines to admit that they had similar lapses but Nev had that hangdog expression I've come to know well in erring ensigns. Anyway, after my little snooze, Nev and I searched the ship from prow to the propulsion units and couldn't find anything illegally stowed. Which is what I think's been happening. Oh, we've put aboard everyone's 23.5 kilos which we thoroughly searched and weighed before I'd permit them to stow it. Nothing hidden in anyone's bundle.

"And the women . . . " Ni Morgana paused, deep in thought and then shook her head slowly. "They're exhausted although they swear blind that they're fine, just that this has all happened so fast. Chio released that little dragoney pet of hers and she bursts into tears if you glance sidewise at her." Then she gave a chuckle. "Nev and I thought to cheer them up and he's a main frame of humorous anecdotes about life in high tech. He's from a colonial family so he's been marvelous at reassuring them. You should have heard the spiel he gave on how they'll be living back on a 'civilized' planet and all the advantages of same. They cheer up a bit and then fall into the weeps again."

Then she turned briskly professional. "We've got additional safety harness

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for all, by the way, and pallets with a local vegetable sponge that is lightweight but cushioning. I figure that all the women should be strapped into the marines' bunks, the kids and the brothers can use the pallets and temporary harness in the wardroom, and the marines will take the extra seats in the cabin with us. Tight squeeze but there're only so many places you can put bodies on this gig. Where *is* Kimmer?'' she asked. ''I think one of us ought to keep a close eye on his movements this evening.'' Then she looked out to the last of the brilliantly red and orange sunset. ''Too bad. This is such a beautiful planet.''

That night a lavish feast was spread for everyone—except the man on duty on the *Erica*. Kimmer urged the officers and the three marines to drink as much of his fine wines as possible, for the tunnel snakes wouldn't appreciate them. When he found the Fleet reluctant to overindulge, he nagged the girls and the three men to ''eat, drink, and be merry.'' Taking his own advice, he passed out before the meal was finished.

''He'll have to be sober by . . . '' and Benden consulted his digital to check, ''0900 tomorrow or he'll be nauseous in take-off and I don't want to have to clean that up when we reach free-fall. Good evening and thank you, Chio, for such a magnificent meal,'' he added and after Saraidh had also complimented the women, the *Erica*'s complement left.

Kimmer looked none the worse for the drink the next morning as he and the others reported on time to board the *Erica*. Nev strapped the Pernese in but Benden made a final check himself. The women were all red-eyed and Chio so patently nervous that he wondered if he should get Ni Morgana to give her a mild sedative.

At the exact second calculated by Lieutenant Zane, the *Erica* lifted from the plateau, blasting her way skyward, tail rockets blazing.

A fisherman, standing the dog watch on his trawler off the coast of Fort Hold, saw the fiery trail, vivid against the grey eastern sky, and wondered at it. He followed the blazing lance of light until it was no longer visible. He wondered what it was, but his more immediate concern was keeping warm and wondering if the cook had made klah by now and could he get a cup.

''The roll rate's too low!'' Benden cried over the roar of the engines, exerting all his strength to keep the right attitude. ''She's a slug,'' and suddenly Benden realized that the *Erica*'s reluctance could be caused by only one thing. ''We've got too much weight on board. She's too bloody heavy through the yoke,'' he said through gritted teeth. He forced his head to look to his right at Nev, strapped in the co-pilot's seat. Ni Morgana was in the next row with Greene beside her while the other marines stoically endured acceleration g-forces in makeshift couches. ''I've got to increase thrust. And that's going to take one helluva lot of fuel.''

Benden made the adjustments, swearing bitterly to himself over the expenditure of so much fuel. His calculations could not be wrong. They were also too far gone in their path to abort and, if they did, there was no way to contact the *Amherst* and arrange a new

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rendezvous. How in hell could she be so heavy?

"Nev, give me some figures on what this is costing us in fuel and the estimated weight we're lugging up."

"Aye, aye, sir," Nev said, slowly moving his hand in the g-force to activate the armrest pad.

Benden forced his head to the side so he could see the bright green numbers leap to the small screen.

"Twenty-one minutes five seconds of blast, sir, was what we should have needed," Nev replied, his voice genuinely strained. "We're bloody twenty-nine point twenty into flight and still not free! We're . . . huh . . . four nine five point five six kilograms overweight! Free fall in ten seconds!"

Ten seconds seemed half a year until they were suddenly weightless. Benden swore as he read the ominous position of the fuel gauge. Still cruising, he adjusted her yaw with a burst of the port jets, swinging her nose towards the Sun. He already knew that they hadn't enough fuel to make their scheduled rendezvous with the *Amherst*. And the cruiser would currently be in the communication's shadow as it made its parabolic turn about Rukbat.

He called up Rukbat's system on the console monitor. There was no way they could use the second planet as a slingshot. But, and he pulled at his lower lip, there was a chance they could make it to the first little burnt-out cinder of a planet. They'd come awful close to Rukbat and even closer to the surface of Number One in order to use its gravity well. That would save fuel. But they'd need a different rendezvous point. That is, if they could get to the same point at the same time, at the same speed and heading in the same direction as the cruiser at some point earlier in her outbound hyperbolic orbit of Rukbat.

"Nev, figure me a slingshot course around the first planet." There was only the one option left to Benden.

"Aye, aye, sir," and the ensign's voice was full of relief.

Then in a taut hard voice, he shot out a second order. "Greene, bring me Kimmer. Tell the others to stay put."

He flipped open the harness release and let himself drift up out of the pilot's seat, trying to figure out just how Kimmer had managed to sneak 495.56 kilograms of whatever it was on board his ship. And when? Especially as the man had been under his watchful eye for over three days.

"Lieutenant," and Nev's voice was apologetic, "we can't take a slingshot around the first planet; not with the weight on board."

"Oh, we'll be lighter very soon, Nev," Benden replied with a malicious grin. "Four hundred ninety-five point fifty-six kilograms lighter. Figure a course with that weight loss."

"What I can't understand," Ni Morgana said in a flat voice, "is what they could have smuggled aboard. Or how?"

"What about your headaches, Sariadh?" Benden asked, seething with anger at Kimmer's duplicity. "And those catnaps no one else's had the guts to report to me."

"What could they possibly have done in ten to twenty minutes, Ross?" Ni Morgana demanded flatly, her nostrils flaring at his implication of dereliction of duty. "Nev and I searched for any

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possibly smuggled goods or tampering."

Benden said nothing, pointedly, and then scrubbed at his face in frustration. "Oh, it's no blame to you, Saraidh. Kimmer just outsmarted me, that's all. I thought removing him from Honshu would solve the problems." He raised his voice. "Vartry, you, Scag, and Hemlet will conduct a search of the most unlikely places on this ship; the missile bins, the head, the inner hull, the airlock. Somehow they've overloaded us and we have got to know with what and dump it!" He turned to Nev. "Try reaching the *Amherst*. I think it's too soon to make contact but get on the blower anyhow."

Kimmer overhanded himself into the cabin then, a smile on his face for the fierce expressions on the three marines as they passed him by.

"Kimmer, what did you get on board this ship and where is it, because we've got less than an hour to make a course correction and thanks to you, we've lost too much fuel lifting the bird off Pern."

"I don't know what you mean, Lieutenant," was the reply, and Kimmer looked him squarely in the eye. "I was with you for three days. How could I have put something on board this vessel?"

"Still stalling, man, it's your life you'll lose as well."

"I'm flattered that you've asked my opinion, Lieutenant, but I'm sure you know better than I what equipment can be jettisoned to lighten her."

Benden stared him down, wondering at the malevolence in the gaze Kimmer returned. "You know what weight I'm referring to and it was all put on at Honshu. If I don't know what that was, Kimmer, you'll be the first thing that lightens this gig's load."

Suddenly they all heard hysterical weeping from the stern and Vartry propelled himself back into the cabin.

"Lieutenant, they started the minute I said we were going to search because the ship was overweight. They know *something!*"

Benden hand-pushed himself deftly down the short companionway to the marines' quarters, the wailing rising to an eerie ululation that made the hairs on the back of his neck rise.

"Stow it!" Benden roared, but Chio's volume only increased. The others were not as loud but just as distraught, plainly terrified and far too hysterical to reply to his demands for an explanation.

Ni Morgana arrived with the medical kit and injected Chio with a sedative which reduced the hysterics but had no effect when Benden questioned her, trying to keep his voice level and reasonable.

"They will not tell you what they have done," Shensu said, careening into the marines' quarters. Absently rubbing the arm he had bruised, he looked down at Chio. "She has always been dominated by him and so have the others. If Kimmer can be *made,*" and Shensu's voice was hard-edged with hatred, "to give them the necessary orders. . . ."

"I think Kimmer will explain, or take a long step out of a short airlock," Benden said, pushing past Shensu. There was no time for finesse or bluff with the *Erica* currently on an abortive course for the second planet. They had to make

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a correction soon. And do it without the excess weight or they'd be beyond rescue. He'd have the truth if he had to space Kimmer and enough of the women to get one of them to tell him what he had to know.

"Lieutenant!" Greene's booming voice was urgent and Benden propelled himself as fast as he could back to the cabin where Greene was searching Kimmer roughly. "Sir, he's wearing metal. I felt it when I frisked him." And as the sergeant peeled back the shipsuit, a vest was exposed, a vest made up of panels of gold. "Shit!"

"Hardly!" Kimmer remarked, smiling smugly.

"Strip him!" Benden ordered and not only was Kimmer wearing a gold vest but a thick belt of gold cast in lozenge shapes. His underpants had pockets filled with thin gold sheets. Greene was nothing if not thorough, and even the boots on Kimmer's feet produced smaller gold plates worked into the soles and ankle leather.

"Saraidh!" Benden roared. "Search those women. Greene, you search the kids, but gently, get me? Shensu, Jiro, Kimo, in here on the double," Benden took some comfort when the three men proved to be wearing no more than their shipsuits.

Ni Morgana's yell confirmed Benden's guess about the women. All the while Kimmer kept in place his slight, amused smile. It took both Vartry and Saraidh to bring the concealed sheets and gold plates the women had secreted to the cabin.

"I'd estimate that's about ten to fifteen kilos per woman and five per kid," she said as they looked down at the pile of gold.

Benden shook his head. "Forty-five kilos is a drop! No where near four hundred ninety-five point fifty-six k's." He turned on the naked Kimmer who smiled back, all innocence. "Kimmer, we're running out of time. Now where is the rest of it? Or had you intended becoming an integral part of Rukbat?"

"You don't panic me, Lieutenant Benden," and Kimmer's eyes glittered with a vengeance that shocked Ross. "This ship's in no danger. Your cruiser'll rescue you."

Benden stared at the man in utter amazement. "The cruiser is behind Rukbat, in com shadow. We can't arrange a different rendezvous. Unless we can lighten this ship, we can't even make a course change for the one chance we have of staying alive!" Benden hauled Kimmer by the arm to the console and showed him the diagram on the screen, and the little blip that was the *Erica*, serenely heading for her original, now nonviable destination. "We certainly don't have enough fuel to make the arranged rendezvous." Then, with his finger, Benden indicated the inexorable path the *Erica* was taking. "Tell us what and where the excess weight is hidden, Kimmer!"

Kimmer contented himself with a wry chuckle and Benden wanted to smash it off his face. But Kimmer was enjoying this too much to give him that satisfaction.

"If that's the way you want to play it, Kimmer. Sergeant, get the stuff and bring it with you," and Benden hustled the naked barefooted colonist down the companionway to the airlock and, palming the control for the inner hatch,

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shoved Kimmer inside, motioned for Greene to throw in the gold, and closed the hatch again.

"I mean it, Kimmer, either tell me what else is on board and where, or you go out the airlock."

Kimmer turned, a contemptuous expression on his face, and he folded his arms across his chest, a gaunt old man with only defiance to clothe him.

"You've more than enough fuel, Benden. Chio checked the gauge. The *Erica*'s tanks were full. Since you had to have used at least a third of a tank to get here, I'm of the opinion that Shensu knew," and his eyes traveled to Benden's left, where Shensu was standing by the window, "as I always suspected, where Kenjo had stored his pilferings." Kimmer drew himself up. "No, Lieutenant, I will call your bluff."

"It's no bluff, Kimmer, and if you had any training as a space jockey, you'd've felt how sluggish the gig was. She's heavy, too heavy. We burned too much in the lift-off. The gold on you and the women isn't enough to cause that. Dammit, Kimmer, it's your life, too."

"I'll have taken a Benden down with me," the man said in a snarl of hatred and sheer malevolence, his face contorted.

"But Chio, and your daughters, your grandchildren—" Benden began.

"They were none of them worth the effort I put into them," Kimmer replied arrogantly. "I have to share my wealth with them but I'm certainly not sharing it with you."

"Sharing?" Benden stared at him, not quite comprehending the man's words. "You think I'm blackmailing you? For a share of your *wealth?*" The disgust in Benden's voice momentarily rattled the man. "There are many people in *my* world, Kimmer, who are not motivated by greed." He gestured with contemptuous anger at the sheets and lozenges at Kimmer's feet. "None of that is worth the risk you want us to take. What have you hidden on the *Erica* and where?"

Just then, Ni Morgana beckoned urgently to Benden. He gratefully moved away from the window. His hand hovered briefly over the evac button. Kimmer could stay where he was, just a thin sheet away from space, and contemplate his situation.

"When I was looking for tanks, I came across a vial of scopalamine in the medical chest. It may be an anesthetic but the right dosage provides the truth, so Chio spilled it out. It's platinum and germanium, sheets of it, stuffed wherever they could when they came aboard on legitimate errands," she said, her voice low enough for Benden's ears only, "and when they drugged whoever was on the dogwatch. That's why we all had headaches."

"Platinum? Germanium?" Benden was astounded.

"Kimmer was a mining engineer. He found ores and we've all had to work in them," Shensu said, pushing over to them. "I wondered why the workroom smelled of hot metal. He must have had the girls melt the ingots down at night, extruding sheets. No wonder they've looked so worn out. I never thought to check on the metals because they'd be too heavy to bring."

"Where is it?" Benden demanded, looking up and down the aisle, momen-

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tarily bewildered when he thought of all the places sheets of thin metal could be unobtrusively attached within the *Erica*. "We've got to search the ship! Everywhere! Sergeant, take your marines to the stern. Shensu, you and your brothers start on the lockers."

"He knew one helluva lot about the interior of gigs." Nev remarked almost admiringly when the marines found that the missile tubes had been stuffed with metal plaques. These were immediately flushed into space.

"And I watched her, Lieutenant," Vartry said, aggrieved, when they found that the locker where the medicines had been stowed was also lined with thin slabs of silvery metal. "I stood here and watched her, heard her tell me she wanted to be sure the medicines were safe, as she slapped sheets top, bottom, and side."

The lockers in which the 23.5 kilo personal allowances had been stowed also proved to be lined with platinum.

"You know," Ni Morgana said, bending one of the thin sheets which she had found under Benden's bunk, "individually these don't weigh much but they damned near coated the gig with 'em. Ingenious."

There were sheets everywhere and still more was found, to be piled at the airlock hatch.

Nev, remembering how he'd entertained Hope and Charity by showing them the cabin, found metal glued to the bottom of the blast couches, lining the inside of the control panel, and thin rolls of metal tacked to the baseboards, looking for all the worlds like innocuous decorations. The viewports had platinum decorated seals. That sent Nev and Scag searching all the ports.

When the pile at the inner airlock door reached the window, abruptly Benden realized the airlock was empty.

"Kimmer? Where's Kimmer?" he cried. "Who let him out? Where is he?"

But Kimmer was nowhere in the ship. A gesture from Benden had the marines on his heels as they propelled themselves to the galley where the brothers were still searching.

"Which of you depressed the evac button?" Benden demanded, seething with impotent anger.

"Depressed . . . " Shensu's look of astonishment was, Benden felt, genuine. There was no regret, however, on his face or his brothers'.

"I'm not sure I blame you, Shensu, but it constitutes murder. You had opportunities enough while we were searching the ship . . . "

"We were searching the ship, too," Shensu said with dignity. "We were as busy as you, trying to save our lives."

"Perhaps," Jiro said softly, "he committed suicide rather than face the failure of that brainstorm of his."

"That is a possibility," Ni Morgana said composedly, but Benden knew she believed that no more than he did. But it was true that, although Kimmer could not have activated the inner hatch of the airlock, the evac button on the outer door was clearly marked. And the mechanisms cycled itself shut in two minutes after use.

"This will be investigated more fully when we have time," Ross Benden promised them fervently, pinning each of the three brothers with his angry glare. "I won't condone murder!"

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Though at just that moment, Benden had several he would like to commit.

Returning to the airlock, he found that Nev was busy with a chisel, letting out a hoot of triumph as he peeled off a paper thin sheet of platinum.

"I'm sure Captain Fargoe wouldn't mind having a platinum-plated gig . . . " His voice trailed off when he caught sight of Benden's expression. He gulped. "There'd be another twenty kilos right in here." And he applied himself to the task of removing it.

Benden signaled for two of the marines to assist Nev while he and the others piled the accumulated sheets, pipings, strips, and lozenges into the lock.

"Amazing!" Ni Morgana said, shaking her head wearily. "That ought to make up the rest of the 495.56 kilos."

She stepped out of the lock and gestured to Benden, who was at the controls. With a feeling of intense relief, he pressed the evac button and saw the metal slide slowly out into space, a glittering cascade left behind the *Erica*. It was still visible as the outer door cycled shut.

"I've half a mind to add their personal allowances," Benden began, feeling more vicious and vengeful than he thought possible, "which would give us another 100 kilos leeway."

"More than that," said the literal-minded Nev and then gawped at the lieutenant. "Oh, you mean just the women's stuff."

"No," Ni Morgana said on a gusty sigh. "They've suffered enough from Kimmer. I don't see the point in further retribution."

"If it hadn't been for the extra fuel, we wouldn't have lifted off the planet," Nev suddenly remarked.

"If it hadn't been for the extra fuel, I don't think we'd've had this trouble with Kimmer," Ni Morgana said sardonically.

"He'd've tried something else," Benden said. "He'd planned the contingency of rescue a long, long time. Those vests and pants weren't whipped up overnight. Not with everything else those women were doing."

"That's possible," Ni Morgana said thoughtfully. "He was a crafty old bugger. All along he counted on our rescuing him. And he'd know we'd have to check body weight."

"D'you suppose he also fooled us," Nev asked anxiously, "about there being more survivors somewhere?"

That thought had been like a pain in Benden's guts since Kimmer's duplicity had come to light. And yet . . . there *had* been no sign of other survivors on the southern continent. Nor had their instruments given them any positive readings as they spiraled across the snowy northern landmass. Then there was Shensu's story and that man had no reason to lie. Benden shook his head wearily and once again regarded the ship's digital. The search had taken a lot longer than he'd realized.

"Look alive," he said, rising to his feet with as good an appearance of energy as he could muster. "Nev, try to raise the *Amherst* again." He knew beforehand that the *Amherst* was unlikely to be receiving. He also knew that he had to alter the course *now*, before they went too far along the aborted trajectory. He didn't have any option. He made his calculations for the appropriate roll to get the *Erica* on the new

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flight path. He'd worry about contacting the *Amherst* later. He couldn't wait on this correction any longer. A three-second burn at one-g would do it. That wouldn't take up much fuel. And he breathed a silent prayer of thanksgiving. "Nev, Greene, Vartry, check our passengers. We've got to burn to our new heading in two minutes forty-five seconds."

He felt better after the burn. The gig was handling easily again. Like the thoroughbred she was, she had eased onto her new heading. And he had done something positive about their perilous situation.

"Now, let's be sure we got every last strip Kimmer added to the *Erica,*" he said, unbuckling his seat restraints. He'd also go through the gig with an eye to what else could be jettisoned. But they'd a long trip ahead of them and precious few comforts for those on board.

"I'll check the women first," Ni Morgana said, pushing herself off deftly from the back of her couch and grabbing the hand hold to propel herself down the companionway. "And see about some grub. Breakfast was a long time ago."

Benden realized how right she was but, under stress, he never noticed hunger pangs. He did now.

"Chow's the best idea yet," he said and managed a reasonably cheerful grin for her.

When she checked the women, she found them still shaken by the emotional prelude and, though they helped her in the galley, they were apathetic. Chio wept silently, ignoring the food Faith tried to get her to eat. She seemed wrapped in so deep a depression that Saraidh reported her condition to Benden.

"She won't last the journey like this, Ross," Saraidh said. "She's deeply disturbed and I don't think it's losing Kimmer."

"Isn't it just that she was so dependent on him? You heard what Shensu said."

"Well, if it is, we ought to sort it out. We can't avoid discussing Kimmer's demise."

"I know and I don't intend to. His demise," and he drawled out the euphemism, "was accidental. I would have preferred to have him alive and standing trial for his attempt to disable the *Erica,*" Benden replied grimly. "What I want to know is how he got those women to sabotage us. They *must* have known from our conversations that their extra mass would seriously burden the ship."

Shensu had floated down the corridor during the last sentence and he gave them a terse nod.

"You must explain to my sisters that the gemstones alone will provide suitably for them," he said, "that the stones will not be confiscated by the Fleet to pay for this rescue."

"What?" Ni Morgana exclaimed. "Where did they get that notion?" She held up her hand. "Never mind. I know. Kimmer. What maggots had he got in his brain?"

"The maggot of greed," Shensu said. "Come, reassure my sisters. They are so fearful. They only cooperated with him on the metal because he said that would be the only wealth left to them."

"And how did Kimmer plan to re-

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move all that platinum from the *Erica*?" Benden demanded, knowing that his voice was rising in frustration but unable to stifle it. "The man was deranged."

"Quite likely," Shensu said with a shrug. "For decades he has clung to the hope that his message would be answered. Or else all he had accumulated: the gems, the metals, meant nothing."

They had reached the marines' quarters and heard Chio's soft weeping.

"Get the kids out of here, Nev," Benden told the ensign in a low voice, "and amuse them. Shensu, ask your sisters to join us here and, by whatever you hold sacred, tell them we mean them no harm."

It took hours to reassure the four women. Benden stuck to his matter of fact, common sense approach.

"Please believe me," he said with genuine concern at Chio's almost total collapse, "that the Fleet has special regulations about castaways or stranded persons. Stranded you were. It would be totally different if the Colonial Authority or Federated Headquarters had organized an official search; *then* there would have been staggering retrieval costs. But the *Amherst* only happened to be in the area and the system was orange-flagged—"

"And because," Ni Morgana took up the explanation, "I was doing research on the Oort cloud, Captain Fargoe ordered the gig to investigate. As she will tell you herself when you meet her, it saves you, the surviving colonists, any cost."

Chio mumbled something.

"Say again?" Ni Morgana asked very gently, smiling reassurance.

"Kimmer said we would be paupers."

"With *black* diamonds? The rarest kind of all?" Ni Morgana managed to convey a depth of astonishment that surprised Benden. "And you've kilos of them among you. And those medicines, Faith," and the science officer turned to the one sister who appeared to be really listening to what was said, "especially that numbweed salve of yours. Why the patents on that alone will buy you a penthouse in any Federation city. If that's where you want to live."

"The salve?" Sheer surprise animated Faith. "But it's common—"

"On Pern, perhaps, but I've a degree in alien pharmacopeia and I've never come across anything as mild and effective as that," Ni Morgana assured her. "You *did* bring seed as well as salve because I don't think that's the sort of medication that can be artificially reproduced and provide the same effect."

"We had to gather the leaves and boil them for hours," Hope said wonderingly. "The stink made it a miserable job but he made us do it each year."

"And numbweed can make us rich?" Charity doubted what she heard.

"I have no reason to lie to you," Ni Morgana said with such dignity that the girl flushed.

"But Kimmer is dead," Chio said, a sob catching in her throat and she turned her head away, her shoulders shaking.

"He is dead of greed," Kimo said in an implacable voice. "And we are alive, Chio. We can make new lives for ourselves and do what we want to do now."

"That would be very nice," Faith said in a low wistful voice.

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"We won't be Kimmer's slaves anymore," Kimo added.

"We would all have died without Kimmer after Mother died," Chio turned back, mastering her tears, unable to stop defending the man who had dominated her for so long.

"Died because she had too many stillborn babies," Kimo said. "You forgot that, Chio. You forgot that you were pregnant two months after you became a woman. You forgot how you cried. I do not."

Chio stared at her brother, her face a mask of sorrow. Then she turned to Benden and Ni Morgana, her eyes narrow. "And will you tell this captain of yours about Kimmer's death?"

"Yes, we will naturally have to mention that unfortunate incident in our report," Benden said.

"And who killed him?" she shot the question at them both.

"We don't know who killed him, or if he cycled the lock open himself."

Chio was startled, as if that possibility had not occurred to her until then. She pulled at Kimo's sleeve. "Is that possible?"

Kimo shrugged. "He believed his own lies, Chio. Once the metal was found, he would consider himself to be poor. He was at least honorable enough to commit suicide."

"Yes, honorable," Chio murmured so softly her words were barely audible. "I am tired. I wish to sleep." She turned herself toward the wall.

Kimo gave the two officers a nod of triumph. Faith covered her elder sister and gestured for them to leave.

Over the next several days, passengers and crew settled into an easier relationship. The youngsters would sit for hours in front of the tri-d screen, going through the gig's library of tapes. Saraidh cajoled Chio and the girls into watching some of them as well, as a gentle introduction to the marvels of modern high-tech civilization.

"I can't tell whether they're reassured or scared witless," she reported to Benden, standing his watch at the gig's console. They still had not made contact with the *Amherst* though he had no real cause for worry on that score—yet. "How many times have you worked those equations, Ross?" she asked, noticing what he had on his pad.

"Often enough to know there's no mathematical errors," he said with a wry grin. "We'll only have the one chance."

"I'm not worried," she said with a shrug and a smile. "Off you get. It's my watch." And she shooed him out of the cabin.

"Lieutenant?" Nev's voice reverberated excitedly down the companionway the next afternoon, "I've raised the *Amherst*!"

There was a cheer as Ross propelled himself to the cabin.

"Neither loud nor clear, sir, but definitely voice contact," Nev said with a grin as if he himself were responsible for the deed.

Ross grinned back at him in relief and depressed the talk toggle on his seat arm. "Ross Benden reporting, sir. We need to make a new rendezvous."

Fargoe's voice acknowledged him and, though her tone broke up in transmission, he really didn't need to hear

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every syllable to know what she said.

"Ma'am, we've had to abort our original course. We are currently aiming for a slingshot around the first planet."

"You want a sunburn, Benden?"

"No, ma'am, but we have only 2.3 kps of Delta V remaining."

"How did you cut it that fine?"

"Humanitarian reasons required us to rescue the ten remaining survivors of the expedition."

"Ten?" There was a pause that had nothing to do with interference on the line. "I shall be very interested in your report, Benden. That is, if your humanitarianism allows you to make it. What is the total of the excess weight you're carrying?"

Nev handed over his pad and Benden read off the figures.

"Hmm. Offhand I don't think we can match orbits. Can you make it five kps?"

"No, ma'am."

"Roger. Hold on while we refigure your course and rendezvous point."

Benden tried not to look toward Nev or at Saraidh, who had joined them at the command console. He tried not to look nervous but felt various parts of himself twitching, unusual enough in gravity and damned annoying for free-fall. He clutched the edge of the console as unobtrusively and as hard as possible to keep from twitching out of the chair.

"*Erica*, Captain Fargoe, here. What can you jettison?"

"How much is required?" Benden thought of the wealth they had just consigned to space.

"You've got to jettison 49.05 kilos. You will need to make a 10g burn for 1.3 seconds around the first planet, commencing at 91 degrees right ascension. That will put you on course, speed and direction and, we devoutly hope, in time to make a new rendezvous. Good luck, Lieutenant." Her voice indicated that he'd need it.

He didn't like a 10-g burn, even for 1.3 seconds. They'd all black out. It'd be rough on the kids. But it'd be a lot rougher to turn into cinders.

"You heard the captain," he said, turning first to Saraidh and then Nev. "Let's snap to it."

"What'll we toss, Lieutenant?" Nev asked.

"Just about everything that isn't bolted down," Saraidh said, "and probably some of that. I'll start in the galley."

In the end they made up the required kilos out of material which Saraidh knew could be most easily replaced by stores on the *Amherst*: extra packs, oxygen tanks which accounted for a good deal of the necessary weight, the messroom table, and all but one of the beacon missiles which the gig carried.

"If Captain Fargoe decides you weren't negligent," Saraidh told Ross, her face expressionless, as they both watched the articles sliding out of the airlock into space, "you won't have to pay for 'em."

"What?" Then he saw she was teasing and grinned back at her. "I've enough I've got to account for, thank you muchly, ma'am, on this expedition without paying for it, too." He kept trying to explain Kimmer's demise to himself and how he could have prevented it, if he could have.

"Now, now, Ross," said Saraidh,

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and waggled a finger at him. They were alone in the corridor. "Don't hang Kimmer about your neck. I subscribe completely to the suicide theory. Temporarily of unsound mind due to the failure of his plan. He might just have done it to be awkward, too."

"I'm not sure Captain Fargoe would buy that one."

"Ah, but she'd never met Kimmer, and I have," and Saraidh gave him an encouraging thumbs-up.

The moment of truth came two long weary weeks later. The temperature inside the *Erica* began to rise with their proximity to Rukbat's sun, reaching an uncomfortable level. Benden was sweating heavily as he watched the ominous approach of the tiny black cinder of the system's first planet. That poor wight hadn't had a chance to survive. He intended to.

"Burn minus sixty seconds," he announced over the intercom. He hadn't informed his passengers of the rigors of a slingshot maneuver. They'd all black out and, if something went wrong, they'd never know it. Meanwhile, he hadn't had to endure Chio's suspicions or the sorrowful reproaches of the other three women. He'd done slingshot passages before, both actual and in simulation. It was more a matter of timing the burn properly just as the ninety-one degree right ascension came up on the nav screen. He just hated blacking out for any reason, not being in control for those seconds or minutes.

"Nine, eight, seven," chanted Nev, his eyes glittering with anticipation. This was his first slingshot. "Five, four, three, two . . . one!"

Benden expressed the burn button, and the *Erica* lunged forward willingly. As he was slammed deep into the pads of the contour seat, he knew the maneuver would be successful and surrendered to the mighty g-forces he had just initiated.

Benden returned to consciousness, the blessed silence of space and the relief of weightlessness. His first glance was for the expended fuel. Point ninety-eight kps left. It should be enough. Provided the course corrections were accurate. He had one last burn to make as they bisected the *Amherst*'s wake and then turned back to her at a sharp vector.

"My compliments, Lieutenant," Ni Morgana said briskly, unsnapping her harness. "We seem to be well on our way now. I think the cook has something special for lunch today."

Benden blinked at her.

She grinned. "The very same thing we had yesterday for lunch."

Benden wasn't the only one who groaned. They'd added supplies at Honshu but the fresh foods were long gone and they were down to the emergency rations: nourishing but uninspired. And that's all they had for the next two weeks. When he was back on board the *Amherst* Ross Benden was going to order up the most lavish celebratory meal in the mess' well-stocked larder. "When," and he grinned to himself. That's positive thinking.

When the *Erica*'s sensors picked up the cruiser's unmistakable ion radiation trail, Benden was in the command cabin, teaching Alun and Pat the elements of spatial navigation. The boys were bright and so eager to prepare themselves for their new life that they were a pleasure to instruct.

"Back to your pads, boys. We've got

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another burn."

"Like the last one?" Alun asked plaintively.

"No, matey. Not like the last one. Just a touch on the button."

Reassured, they propelled themselves out of the cabin and down the companionway, dexterously passing Saraidh and Nev at the door.

"A touch being all the fuel we've got left," Saraidh murmured, taking her seat. She leaned forward, peering out into the blackness of space around them.

"You won't see anything yet," Nev remarked.

"I know it," she replied, shrugging. "Just looking."

"It's there, though."

"And not long gone," Benden added, "judging by the strength of the ion count." He toggled on the intercom. "Now listen up. A short burn, not like the last, just enough to change our course to match up our final approach to the *Amherst*." In an aside to Saraidh he added, "I feel like a damned leisure liner captain."

"You'd make a grand one," she replied blandly, "especially if you have to change your branch of service."

"My what?" Benden never knew when Lieutenant Ni Morgana's wayward humor would erupt.

"Lighten up, Ross. We're nearly home and dry."

"Fifteen minutes to course correction." He nodded to Nev to watch the digital while he contacted the *Amherst*. "*Erica* to *Amherst*. Do you read me?"

"Loud and clear," came Captain Fargoe's voice. "About ready to join us, Lieutenant?"

"That's my aim, Captain."

"We'll trust it's as accurate as ever. Fire when ready, Gridley."

"Captain?"

"Roger, over and out."

Beside him, Saraidh was chuckling. "Where does she get them?"

"Get what?" asked Nev.

"Are you counting down, Ensign?"

"Yes, sir. Coming down to ten minutes forty seconds."

Why was it time could be so elastic? Benden wondered as the ten minutes seemed to go on forever, clicking second by second. At the minute, he flexed both hands, shook his shoulders to release the tension in his neck. At zero, he depressed the burn on the last point ninety-eight kps in the tank, yawing to starboard. He felt the surge of the good gig *Erica* as she responded. Then all of a sudden the engines cut out with the exhausted whoosh that meant no more fuel in the tank.

Had the *Erica* completed the course correction? Or had the engines stopped untimely? The margin was so damned slight! And the proof would be the appearance of the comforting bulk of the *Amherst* any time now. *If* the maneuver had been completed before the fuel was exhausted.

Like the two officers beside him, Benden instinctively leaned forward, peering out into the endless space in front of them.

"I've got a radar reading," Lieutenant," Nev said, and there was no denying the relief in his voice. "It can't be anything but the *Amherst*. I think we're going to make it."

"All we need is to get close enough for them to shoot us a magnetic line," Benden muttered.

Nev uttered a whoop. "Thar she be!"

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and he pointed. Benden had to blink to be sure he actually was seeing the running lights of the *Amherst*. He was close to adding his own kiyi of relief and victory.

Just then the comunit opened to a sardonic voice. "That's cutting it fine indeed, Lieutenant!" The blank screen cleared to a view of the captain, her head cocked and her right eyebrow quizzically aslant. "Trying to match your uncle's finesse?"

"Not consciously, ma'am, I assure you, but I'd be pleased to hear the confirmation that our present course and speed are A-OK for docking?"

"Not a puff of fuel left, huh?"

"No, ma'am."

She looked to her left, then faced the screen squarely again, a little smile playing on her lips. "You'll make it. And I'll expect to have reports from both you and Lieutenant Ni Morgana as soon as you've docked. You've had time enough on the trip in to write a hundred reports."

"Captain, I've got the passengers to settle."

"They'll be settled by medics, Ross. You've done your part getting them here. I want to see those reports."

And the screen darkened.

"Got yours already, Ross?" Ni Morgana asked with a sly grin as she swiveled her chair around.

"Got yours?"

"Oh, it's ready, too. I said that I believed Kimmer suicided."

Benden nodded, glad of her support. "It would have had to have been self-destruction, Saraidh. He would have been far more familiar with airlock controls than Shensu or his brothers," Benden said slowly, considering his words. "It's really far more likely that he did suicide, given the fact that he had failed to bring along all that metal. Damn fool! He must have known that he was dangerously overloading the ship. He could have murdered *us*." That angered Benden.

"Yes, and nearly succeeded. I think he was hoping that his death would have brought suspicion on the brothers as the most likely to wish his demise," Ni Morgana went on. "He would have liked jeopardizing their futures. And discrediting another Benden if he could." When she heard Benden's sharp inhalation, she touched his hand, causing him to look at her. "You can still be proud of your uncle, Ross. You heard what Shensu said, and how proud he was of the way the admiral marshalled all available defences."

Benden cocked his head, his expression rueful. "A fighter to the last . . . and it took a wretched planet to defeat him."

"Poor planet Pern," Saraidh said sadly. "Not its fault but I'm recommending that this system be interdicted. I did some calculations—which I'll verify on the *Amherst* computers—and rechecked the original EEC report. That wasn't the first time the Oort organism fell on the planet. Nor will it be the last. It'll happen every 250 years, give or take a decade. Furthermore, we don't want any ship blundering into that Oort Cloud and transporting that organism to other systems."

She gave a shudder at the thought.

"There she is," Benden said with a sense of relief as the viewport filled with the perceptibly nearing haven of the *Amherst*. "And, all things considered, a successful rescue run." ■

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Jay Kay Klein's biolog

The millionaire meat packer of one novel credits his prosperity: "Pigs done it." For real-life *Analog* writer Anne McCaffrey; "Dragons done it." From the name of her estate "Dragonhold," it's not clear whether she's holding a dragon or a dragon is holding her, but no matter who's on top, it's clearly a case of mutual love. Science fiction fans who recall *Terry and the Pirates*, call Anne the "Dragon Lady."

Born in the non-exotic locale of Cambridge, MA, and raised in mundane Montclair, NJ, she went to her ancestral Ireland in 1970, determined to earn her daily potatoes as a full-time writer. Her little girl wistfully hoped someone would pay lots of money for mummy's new novel so she could have something to eat besides pancakes. (In County Wicklow, pancakes are not lightweight, sweet, wheaten confections drenched with butter and maple syrup.) Ireland is the only country with a legislature intelligent enough to free writers and artists of an earnings tax that elsewhere would drive them to PR work and sign painting.

Once nearly as rare as dragons, educated, determined women were nurtured in such isolated strongholds as Radcliffe. "Cliffie" Anne McCaffrey performed the notable feat of securing a cum laude degree in Slavonic languages and literatures. Also a trained opera singer, she worked as an actress and opera stage director. A horsewoman with a formidable seat, she has also been a stable manager and livery stable owner. Science fiction writing started with a first published story in 1953 when she thought someone ought to portray women as educated and determined rather than some man's *objet d'arms*. At her first SF convention in 1963, she realized just how male dominated the field was, but *Analog* writer James Blish, agent Virginia Kidd, and editor John W. Campbell encouraged her. John bought her first *Analog* story for the March, 1966 issue. Since then, she has won a Hugo, a Nebula, and a half-dozen other awards.

For good reasons, SF developed first in the technologically advanced countries of England, France, and the United States. In Ireland, Anne is best known for her champion horses and romantic fiction. There, SF is apt to be confused with children's literature, a benefit when juvenile books are imported duty-free. Her manuscripts are batted out on a Compaq 386, with peripheral Compuserve.

Anne feels that SF describes futures to people who may wonder if there is any future. Stephen Jay Gould notes that with successful types of life forms lots of species inhabit many environments. Less successful creatures are confined to limited habitats and as they near extinction, often dwindle down to just a few species. Of the arthropods, beetles alone have thousands of species. Man is down to only one, dependent on a single, extended biosphere. Perhaps learned crustacea in a distant future will debate if the mass extinction of vertebrates resulted from greenhouse summer or nuclear winter.

Anne McCaffrey is busily drawing maps of exploration for us, pointing out where innumerable new habitats exist. Other *Analog* writers do this, too, but hers mark the unknown seas of space with "Here there be Dragons!" ■

Anne McCaffrey

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Jack C. Haldeman II

ENEMY OF THE STATE

Revolutionaries are made, not born. . . .

INSERT CARD. ENTER YOUR SECRET NUMBER. . . .

Good Morning, Mr. Haldeman, this is FOOD-NET, your friendly computer-assisted shopping guide. We here at MOM & POP GROCERY INC. are pleased to announce many specials in the brands that our records show you typically purchase from our Main Street store.

Texas Light Beer, which you consume at an average rate of 3.7 cases a week, has been marked down 36¢ a case from our everyday low price. This represents a potential savings to you, our valued customer, of $67.34 a year.

We here at MOM & POP notice that you have started smoking again after a 2.3 year lapse. Thank you for making an informed choice. May we suggest you check out our toothpaste selection and perhaps consider shifting from Ultra Dazzle to Scrub-It-Away, a special toothpaste designed with smokers like yourself in mind. Sure, it costs a bit more, but wouldn't you feel more confident and self-assured knowing that those ugly nicotine stains won't embarrass you in public? While you're at it, we offer a wide selection of cough drops one aisle over.

According to our files, Mr. Haldeman, you were due to purchase fish food two weeks ago. We sincerely hope your beloved pets have not met with misfortune. If so, may we suggest a visit to THE WONDERFUL WORLD OF PETS for a replacement? Mention FOOD-NET at your time of purchase for a 5 percent discount.

INSERT CARD. ENTER YOUR SECRET NUMBER. . . .

A well-tuned car is a happy car, Mr. Haldeman. Our service records show that it's time for a tune-up and oil change. And at your average rate of 1,872.45 miles per month, those tires we sold you last September must be going bald by now. If you don't care for your own safety, please consider the lives of your loved ones and the fate of any innocent bystanders who might be-

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come involved in the fatal accident you will probably cause if you don't buy new tires from us soon. Don't forget our SLO-PAYMENT plan, an easy-on-the-wallet feature which enables almost anyone to get new wheels and zip along life's highways, assured that they're riding on the best, *safest*, tires around. Some restrictions may apply.

INSERT CARD. ENTER YOUR SECRET NUMBER. . . .

Welcome to MED-CHECK Mr. Haldeman. We notice that your consumption of aspirin is up. This, coupled with your observed increased use of antacids has us here at MED-CHECK quite concerned. Perhaps you should see Dr. Foote at your earliest convenience. There are many wonderful tranquilizers on the market these days, and we would be only too happy to add her presciption to your standard account. We stand by our many happy customers and are proud to serve you.

INSERT CARD. ENTER YOUR SECRET NUMBER. . . .

Your order through Interlibrary Loan has been processed, Mr. Haldeman. We are holding *Terrorism Throughout the Ages* on our reserve shelf for you. Unfortunately we have been delayed in locating a copy of *The Anarchist's Cookbook*. You will be notified when it arrives. Thank you for using DIAL-A-BOOK, one of the many user-friendly features of your County Library System.

INSERT CARD. ENTER YOUR SECRET NUMBER. . . .

Please notice the enclosed increase in your automobile insurance, Mr. Haldeman. While you have always been carried as a Safe Driver on our books, it has come to our attention that you consume an inordinate amount of beer and fail to maintain your vehicle in tip-top condition. This, coupled with your unfortunate decision to resume smoking has left us no choice but to raise your rates. If you have any questions, please call our 800 number from any touch-tone phone.

INSERT CARD. ENTER YOUR SECRET NUMBER. . . .

Our records show that it is past time for your annual dental checkup and cleaning, Mr. Haldeman. We sent you notices on the 8th, 15th, and 21st of last month and you have not yet replied. Really, Mr. Haldeman, your teeth are the most important organ in your body, and you are doing yourself no good at all in ignoring our reminders. We simply cannot be responsible for your mouth if you do not follow recommended dental hygiene procedures.

INSERT CARD. ENTER YOUR SECRET NUMBER. . . .

Dear [Client Name=] *MR. HALDEMAN*. Our databanks here at THE WONDERFUL WORLD OF PETS show that it is time for your [pet type=] *GOLDFISH*, [pet name #1=] *HYDE* and [pet name #2=] *ZEKE*, to receive their annual [treatment #1=] *RABIES SHOTS* and [treatment #2=] *HOOF CLEANING*. Please do not delay in setting up an appointment for these vitally important procedures. Mention our name when purchasing fish food at [Info Exchange Member=] *MOM & POP GROCERY INC.* for 25¢ off.

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* * *

**** *ERROR DETECTED* ****

**** *DELETE MESSAGE* ****

**** SEND AGAIN ****

Dear *MR. HALDEMAN*. Our databanks here at THE WONDERFUL WORLD OF PETS show that it is time for your pet *GOLDFISH, HYDE* and *ZEKE*, to receive their annual *RABIES SHOTS* and *HOOF CLEANING*. Please do not delay in setting up an appointment for these vitally important procedures. Mention our name when purchasing fish food at *MOM & POP GROCERY INC*. for 25¢ off.

INSERT CARD. ENTER YOUR SECRET NUMBER. . . .

A number of flags in our master computer have brought you to our attention here at the sheriff's office, Mr. Haldeman. We would like to discuss a few things with you. . . .

Our sources show that you have been receiving mail at a post office box for several years now. Surely you do not live in a PO Box. Please supply us with your actual physical address. Studies have shown that individual (non-business) owners of PO Boxes often have ulterior motives in hiding behind a box number.

Repeated calls to your unlisted home phone have revealed that you utilize an answering machine. It is well known that individuals with such equipment are almost always concealing information, especially those with unlisted numbers.

Deposits to your checking account in May ($26.50) and December ($42.25) of last year were of a cash nature. Please substantiate where this money came from. Our local banks have been most cooperative in alerting us to possible money laundering activities. You also deposited two checks last year from *Analog* magazine. We are interested in your proof that this is a legitimate publication and not a front for a South American drug cartel.

You are on record as a substance abuser (beer, nicotine, and caffeine). You subscribe to seventeen different magazines, some of which (*Playboy, Penthouse, Analog*) are, to say the least, suspect reading material. You exhibit wanton disregard for public safety by operating your motor vehicle without the proper maintenance any good citizen would perform as a matter of course. As a science fiction writer, your abnormal interest—as verified by library records—in Satanism, ESP, and home-brewed beer can be considered morally questionable to the point of possibly being criminal in intent.

In short, Mr. Haldeman, you fit every profile we've got, from parking ticket scofflaw to mass murderer. To answer these questions, please call our hotline number between the hours of 8 A.M. and 5 P.M. using a standard touch-tone phone. Otherwise, we will be forced to send an officer to PO BOX 12123 in order to interview you in person.

INSERT CARD. ENTER YOUR SECRET NUMBER. . . .

Thank you for requesting the services of Interlibrary Loan, Mr. Haldeman. We are holding a copy of *High Explosives for Fun and Profit* for you on our reserve shelf. Your copy of *The Anarchist's Cookbook* has also arrived. Thank you for using DIAL-A-BOOK. Have a nice day. ■

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Stephen L. Gillett, Ph.D.

REFUELING A RUNDOWN PLANET

Here's something for those who *really* like to plan ahead. . . .

The Earth is running down. In only a few billion years, the volcanoes will congeal, sea-floor spreading will stop, and the tectonic plates will grind to a halt. Continents will stop drifting, trenches will stop subducting . . .

Erosion will take over. And before too much longer—a few tens of millions of years, maybe—the Earth will look like a cue ball, a wet cueball. It will be flat and featureless, with worldwide seas of almost uniform depth, the continents ground down and the abyssal basins filled in. Quartz sand—durable, chemically stable, and abundant—will blanket great tracts of the sea floor. Although extensive sand sheets have spilled across the sea floor here and there in the geologic record, during times when sea level has stood unusually high (a "marine transgression"), these will be much faster, and more stable, than anything that happened before.

Well, so? I mean, sure, it'll be different: no land life, and no polar caps either: since there will be free circulation of sea water pole to pole, the water and climate will be warm worldwide. And the deep sea will be anoxic, since there

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will be no cold, aerated polar water to sink and drive ocean circulation; warm, saline, and oxygen-poor equatorial water will sink instead. But this is hardly different from times in Earth's past, when the oceans have been extensive and the continents arranged so that water circulated freely from equator to pole. Life has flourished just fine in those circumstances.

It's more than different this time, though . . . it's a calamity for the biosphere. Nutrient elements get buried on the sea floor, as biologic material—dead critters, waste, shells, and so on—settles to the bottom. Even in the modern ocean, there's a nutrient gradient; deep water is much richer in nutrients than surface water, which is why high productivity occurs in areas of upwelling, where nutrient-rich water comes to the surface. Phosphorus especially, which is critical to Earthly life, tends to plate out on the sea floor. We see lots of phosphate deposits in sedimentary rocks in the geologic record; in fact, the richest are mined for fertilizer.

On an active Earth, though, with the plates shifting, mountains rising, and volcanoes popping off, the nutrients don't stay buried. For one thing, deep sea-floor deposits get carried to subduction zones, where they either sink into the mantle to be melted and reerupted later, or else accumulate in the trench, later to pop up as new mountains.

Earth's tectonic processes do more than make spectacular scenery. They keep our planet habitable by keeping nutrient elements in circulation.

Well, even so, it hardly matters, since the Sun is running down too. In a mere four billion years or so, old Sol will swell into a red giant and fry the Earth. In fact, climatic catastrophe may happen even sooner than that, in just a billion years or so. As helium from hydrogen fusion builds up in the Sun's core, it burns hotter and hotter. It's already increased its luminosity about 30% since it started shining some 4.5 billion years ago, and some climatic models suggest that the Sun only has to increase its luminosity another 10% or so to set up a "greenhouse runaway," like the one that fried Venus very early in Solar System history. All *Analog* readers have heard of the "greenhouse effect": sunlight easily comes in through the Earth's atmosphere to warm the surface, but infrared radiation from the warmed surface has trouble getting out again, because it's absorbed by certain gases in the atmosphere.

The most famous greenhouse gas is, of course, CO_2, and we've heard a lot about a possible increase in Earth's greenhouse effect from the increase in CO_2 brought about by burning fossil fuels. But in Earth's atmosphere, ordinary water vapor is the most important greenhouse gas, and its concentration is set by evaporation from the oceans. And this leads to a positive feedback: the warmer things get, the more water evaporates, and the greater the greenhouse effect; so things warm up yet more, so that more water evaporates, so that things get even hotter. . . . At temperatures not too much higher than the Earth's average right now, this feedback does not limit out; temperatures

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soar and the oceans boil. That's the runaway greenhouse.

So even before the Sun's red gianthood, Earth's going to be parboiled. But there may be a way to fix that. Martyn Fogg (*Analog*, March 1990) has described how, with some far-future technologies, we might preserve the Earth by replacing the Sun. Presumably this would be done for sentimental reasons, since a civilization *that* advanced is not going to need either Earth's room or its resources.

Replacing the Sun's not gonna help, though, if the Earth's run down too. Is there any way to fix that?

Let's see. What drives tectonics and volcanism to begin with? (Tectonics is geologese for all the processes that raise the land, build mountains, shift faults, and so on.) The answer was recognized by the great British physicist William Thompson, Lord Kelvin, over a century ago: it's driven by the Earth's internal heat, which is slowly escaping. Earth is a gigantic heat engine, and it's cooling off.

So far, so good; but then Kelvin went too far. From his calculations of how fast the Earth was cooling, he asserted that the Earth couldn't possibly be as old as the geologists claimed. Kelvin dismissed the geologic data for an ancient Earth, which was already vast even in the late 19th century, out of hand; it was not quantitative, and therefore not "scientific". Which just shows how you can get into deep trouble by taking your numbers too seriously. Kelvin assumed both that he knew all physical laws applying to the Earth, and also that he knew *how* the laws applied. He was wrong on both counts. (This hasn't prevented physicists since from making pronouncements about how very complex systems "must" behave—but I digress.)

Anyway, Kelvin made two bad assumptions: (1) there are no sources of heat in the Earth; the only heat the Earth has was there when it was formed; and (2) the heat is lost from the Earth only by conduction. Both assumptions were wrong—and the lowly, non-quantitative geologists were right about the great age of the Earth after all.

First, there *are* internal heat sources in the Earth: long-lived natural radioactive elements. We'll be talking about them a *lot* soon. When a radioactive atom decays in a rock, the energy of its decay eventually shows up as heat.

Second, it turns out that extremely slow convection is important in the Earth over geologic timescales. Convection is the heat transport process you see in a coffee cup with cream just added. Hot coffee rises, and cold cream sinks; and as the coffee on the top cools and the cream below heats up, they again exchange places. Thus the coffee circulates. The Earth's mantle turns over in this way, but excruciatingly slowly; probably on the order of once every few hundred million years. Although the mantle is solid rock, it deforms very slowly, such that it acts like an extremely viscous liquid over geologic time.

Why is this important? Because convection lets you tap the heat of most of the Earth. Rocks are terrible conductors

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of heat, and if conduction is the only way the heat can be lost, the outer part of the Earth cools relatively quickly while all the heat still inside is trapped. It's effectively isolated by a giant insulating layer. Convection is a much more efficient way of moving heat out.

So, Kelvin was not just too conservative in that he assumed he knew all the laws of physics already, so that no unknown heat sources could exist in the Earth. He didn't even apply all the physics he knew! He dismissed convection in the Earth, because he didn't consider that rocks could flow over geologic time. And it turns out that the Earth's convection is at least as important as radioactivity in maintaining the heat flow we see at the surface.

Still, Lord K. was right in the long term—he was just off by a few orders of magnitude. Earth *is* cooling off, and even the radioactivity that keeps things running will decay away eventually. So to keep the Earth from running down, we need to boost its internal heat.

One notion that immediately occurs is to replenish Earth's mantle with radioactive elements. If we dump radioactives down the Earth's trenches, long before subduction stops completely, we can keep the Earth's heat sources replenished, and tectonics won't ever stop.

Ah! What a great way to get rid of nuclear waste! And how poetic, too; using nuclear waste to help the Earth.

Well . . . not really. Radwaste isotopes are too geologically ephemeral to do any good. The main energy-producing radioisotopes in the Earth are the radioactive isotope of potassium, ^{40}K (which makes up about 1 atom in 10,000 in ordinary potassium), thorium-232, and the two isotopes of uranium, ^{235}U and ^{238}U. These isotopes have half-lives ranging from a bit less than a billion years for ^{235}U, to about 10 billion years for thorium. Thus, they last over time scales on the order of the age of the Earth—4.5 billion years. (There are a number of other Earth-lived isotopes, which are important for geological age dating. Their heat contribution doesn't amount to diddly-squat, however.) By comparison, the radioactive species in radwaste are gone in a geological eyeblink; even plutonium-239, with its 25,000 year half-life, has vanished within a million years. (The longer-lived radwaste isotopes, like 17-million year iodine-129, are too rare and put out too little energy to matter.)

So if we're going to pour radioactive elements down subduction zones, they're going to have to be *very* long-lived to do any good. They'll have to be things like uranium-235.

Ah, hah! Some of you will have noted that I pulled a fast one a couple paragraphs ago. Plutonium-239 decays into uranium-235, so even though most of the radwaste decays too fast to be useful, *some* of the stuff it decays into does last for a very long time.

But this leads into the second problem: there's not enough radwaste to matter. The Earth loses a staggering amount of heat over geologic time, and to say the contribution from nuclear waste would be a drop in the bucket doesn't do it justice. It's more like a

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drop in the ocean. Anyway, before very long fissionable metal is going to be too valuable to chuck down a subduction zone. Instead, we're going to need to reprocess radwaste for its uranium and plutonium content.

Just how "staggering" is the amount of heat Earth puts out? Well, typically it's about a millionth of a calorie per square centimeter. (For comparison, a square centimeter at the equator receives about 30,000 times as much energy from the Sun—which is why the ground doesn't usually feel hot from Earth's heat.) Since the surface area of the Earth is about 5.1×10^{18} square centimeters, the total output is about 2.1×10^{7} megawatts. Now multiply this by a fudge factor of 2 or so to account for anomalously warm areas like volcanoes and sea-floor spreading centers, and you get a total of about 5×10^{7} megawatts.

That's pretty staggering. And obviously, it's an underestimate; the Earth put out much *more* heat in the past, before so much of its radioactive complement had decayed away. ^{235}U and ^{40}K in particular were much more abundant in the early Earth because of their relatively short half-lives. (For example, because there's been about 6 half-lives of ^{235}U since the Earth formed, there's only $1/2^6 = 1/64$th as much now as there was then.) And sure enough, this high production in the young Earth had effects. In some rock sequences over a billion years old, we see lavas, called "komatiites," that don't occur today. They are highly magnesium-rich and silica-poor, and are fluid only at very high temperatures. The Earth is just not hot enough now to generate such lavas.

On the other hand, not all that heat is coming from down where it's useful. Potassium, thorium, and uranium are all what geochemists call "incompatible" elements. They have large ions that don't fit into the compact, iron-magnesium silicates that make up the mantle, so over time these elements tend to get sweated out into the crust. Crustal rock is a *lot* richer in these radioactive elements; something like 10% of all Earth's potassium, for example, is within 20 kilometers of the surface. Still, for ball park numbers we don't need to worry about this complication either.

Well, so how much radioactive heat production do we need? Ah, here's the nitty-gritty. Let's just assume that all the heat comes from ^{40}K. It doesn't, but it might as well; the Earth doesn't care what atom disintegrated to make the heat. And fissionable metals like U and Th are going to be too useful for other things.

A gram of pure potassium-40 produces about three-tenths of an erg every second, or three hundred-millionths of a watt. So, the Earth's heat generation is equivalent to about 2×10^{18} kilograms of ^{40}K.

Two *quadrillion* tonnes. Yes indeed, a staggering amount. If you took that amount of ^{40}K and made it into a sphere, it would be about 240 kilometers across—about like a very large asteroid.

But now I've overstated things. The Earth is already producing heat. The problem is that it produces less and less

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heat with time. So all we have to do is make up the difference over time.

Let's look at it another way; a gram of pure ^{40}K produces 3×10^{-8} watts, but that gram doesn't stay pure. As it produces energy, the ^{40}K changes into other things*, and less and less of the gram is ^{40}K as time goes by. So the gram produces less and less energy.

For ongoing maintenance, then, we need to add just enough ^{40}K to make up what's decayed. In 1 year, 0.000 000 05% has decayed, so that's all we have to add. Hence, if we just drop 0.000 000 05% of 2,000,000,000,000,000 tonnes, or about a million tonnes, down a subduction zone each year, the Earth will never run down. (Approximately, of course; much of the present-day heat is instead produced by uranium and thorium, and I'm neglecting the difference in their half-lives; but we're just doing the BOTE** calculation here.)

That's within the range of industrial processes today, at least for large-volume commodities like coal or aggregate. But, of course, there's a rub; where are we going to get the ^{40}K?

Maybe we can scoop it up from surface and run it back down to where it'll do some good? As I said, potassium's incompatible, and a lot is sitting up here in near-surface rock. In fact, potassium's the eighth most common element in the crust, a reserve that amounts to something like 6×10^{17} tonnes. There's even something like 6×10^{14} tonnes in sea water, which would be easy to separate out.

Just a couple problems, however: first, remember that only one atom in 10,000 of ordinary potassium is ^{40}K (the other 9,999 are stable ^{39}K and ^{41}K). So, either we send down 10,000 times as much potassium as we would otherwise have to—which is 10,000 times as expensive—or else we go through the hassle to separate out just the ^{40}K. But separating different isotopes of the same element is *hard*, especially on a (mega)-industrial scale. That, of course, was probably *the* major technical problem in the Manhattan Project: enriching natural uranium in the fissionable isotope ^{235}U to the point that the metal could sustain a chain reaction. A vast industrial infrastructure was built— from scratch—just for such enrichment. And we're talking about separating out perhaps a million times as much ^{40}K—*per year*—than was ever needed for uranium, even if the civilian and military demands are combined.

And in any event, we have to mine 10,000 times as much raw potassium as we need.

The second problem is that over time we're going to need a *lot* of potassium-40, and it's only 0.01% of those potassium reserves. At a million tonnes/year, those reserves will last for only 7 million years or so.

Well, OK, that sounds like a long time, in terms of everyday life. But remember, we're presuming to preserve the Earth over geologic time scales here. In that perspective 7 million years

*About 80% decays into calcium-40, and the rest into argon-40, which eventually ends up in the air. The 1% argon in the atmosphere is nearly all from ^{40}K decay.
**Back of the envelope!

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is an eye blink. Anyway, we can't realistically mine more than a fraction of the potassium in the Earth's crust: What use to maintain the Earth's habitability if you strip-mine its entire surface doing so?

Well, what about making ^{40}K instead? Say, use all that ^{39}K we mined, and add a neutron to it to get ^{40}K. Since about 93% of natural potassium is ^{39}K, we could use virtually all those potassium reserves, not just the 0.01% that happens to be ^{40}K already.

Sure, it takes energy to make the ^{40}K: about two billion joules for every gram of potassium, or about 2×10^{21} joules (per year, remember!) for a million tonnes of ^{40}K. But that will be available in the far future. After all, the Sun pours out over 10^{26} joules per second. But still, this is hardly a negligible commitment. Also, if you're not careful, you get lots of radioactive argon-39 as a by-product. When you shoot in a neutron, a proton tends to pop out. But presumably these problems are "just engineering."

Now, once we've made it, how are we going to get the ^{40}K down there? We can't use metallic potassium, obviously. As all *Analog* readers already know, potassium is a highly active metal and it reacts spectacularly with water. (It used to be a flashy school lab demonstration, before education budgets got overwhelmed by liability costs.) Simple potassium compounds also won't work; they're soluble, and our ^{40}K will just end up in sea water. To immobilize the potassium till it gets down where it's needed, we need to put it in insoluble compounds, such as glasses, or simple silicates like the rare mineral kalsilite ($KAlSiO_4$). This is just the sort thing that's been proposed to immobilize nuclear waste.

Of course, we have to keep this up, continuously, for billions of years. Humans aren't noted for persisting at time scales on that order. In fact, if things go as they have all through history, nothing will be done until there's a crisis. So here are some possible quick fixes using far-future technology.

One quickie way to juice up the Earth's interior might be to irradiate it with some extremely penetrating radiation. If we could zap the planet with something that didn't get absorbed by the crust, only by the Earth's deep interior, then we could introduce a lot of heat quickly down where it's needed.

The problem here is that there's nothing penetrating enough. Most known types of radiation will just make the outer parts of the Earth hot—in both the literal and tech-slang senses. Ordinary neutrons, for example, won't penetrate more than a meter at most.

I did say "most" known types of radiation. Of course, there is one type of subatomic particle that is extremely penetrating: the neutrino. It barely interacts with ordinary matter. A single neutrino has a good chance of passing through a light-year of lead unscathed.

But this is *too* penetrating. Virtually all neutrinos go right on through the Earth. Which is kind of wasteful, especially if you were to spend lots of energy making them.

Maybe there's an exotic form of radiation betwixt and between, much less

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penetrating than the neutrino but much more penetrating than anything else, but to my knowledge there's no room in current physics for it. But here I will have to defer to John Cramer.

Let's try another tack. What about the core? It's made of iron-nickel alloy, seasoned with some sulfides. Iron metal, of course, is an electrical conductor. In fact, the Earth's magnetic field comes from electrical currents circulating in the core.

Now, it's pretty easy to heat an electrical conductor, if it doesn't conduct *too* well. Put your not-so-good conductor inside a coil, and run AC thru the coil. Lots of AC. The rapid variation of the current in the coil induces currents in the not-so-good conductor, and those currents generate heat as they work against the conductor's electrical resistance. This, of course, is induction heating, and it's used in lots of industrial processes.

Can we use induction heating to heat the core? Freeman Dyson, who does not think small, has proposed an enormous motor for spinning up a planet. You set up gigantic coils in space around the planet, and also run coils around the planet itself. Then, run current through the two sets of coils. If you do it right, the planet feels a torque, just like the armature of an electric motor. A planetary induction heater would be even easier. Omit one set of coils, and make the other *very* heavy duty; then run AC through it. Anything that conducts modestly within the coils, i.e., the planet's core, heats up.

Unfortunately this probably won't work on the Earth because our planet has too many conductors right near the surface, due to the abundance of water. Earth rocks are generally slightly damp, and that greatly increases their electrical conductivity. (Several geophysical exploration techniques use the electrical conductivity of rocks, by the way.) Thus, an induction heater that could heat the interior significantly would fry the surface first.

Maybe it's going to be simpler to get a new Earth after all. ■

●It is better to be numbered among fools than to be isolated among the wise and to see oneself alone against everyone.

Molière

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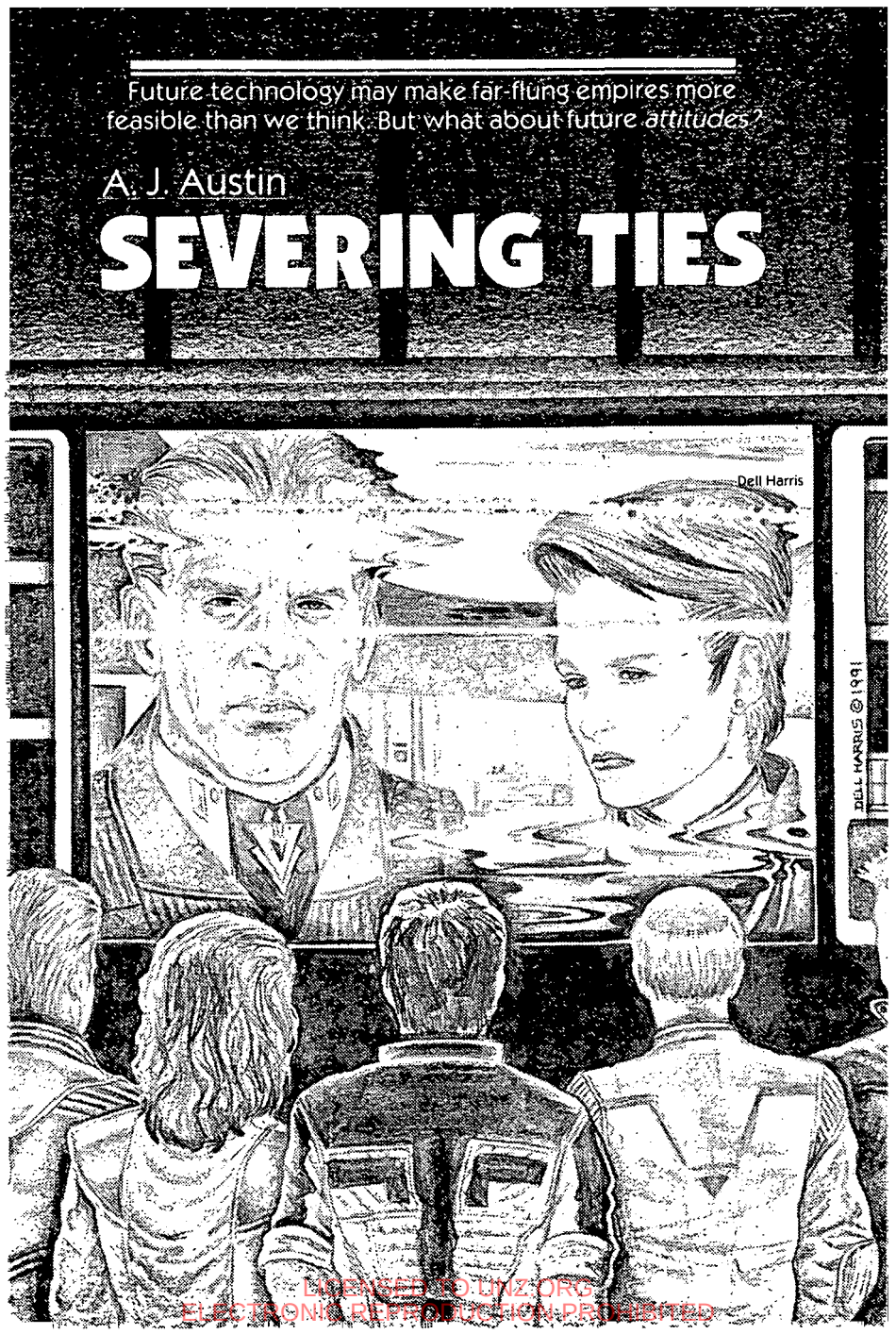
Future technology may make far-flung empires more feasible than we think. But what about future *attitudes*?

A. J. Austin

SEVERING TIES



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Karl Manteo ignored the shouting and increasing disorder of the Council hall, and instead examined the handiwork of the solid oak gavel in his hand. It had been a gift from his father, a going away present for a son he'd never see again. His father had turned the gavel himself, on an old lathe that had belonged to Karl's grandfather. He'd cut and polished the brass fitting around the malletlike head himself as well, and buffed the wood surface to a smooth finish, staining it a dark, antique-looking hue. With the transit to Carthage lasting nearly fourteen years, Earth time, his father was long dead before Karl ever had the chance to use the gavel in his official capacity as colony chairman.

He looked out over the noisy hall, filled now beyond its 300-plus seating capacity. Dozens more stood uncomfortably in the back, with still more crowded around each open window and door. What had begun as an orderly emergency session had turned into a rowdy free-for-all. The entire assembly was engaged in argument now. A glance to either side of him showed that even the other four members of the Colony's governing Council, seated with him on the long table placed in the center of the low stage at the front of the hall, were arguing among themselves nearly as rigorously as those in the seats before him.

Enough, he thought.

Without a word he tapped the gavel hard, once, on its matching strike plate before him. Then again. And again and again until at last the noise level in the room diminished, finally subsiding to a steady, but tolerable buzz of mixed voices. He rested the gavel gently on the strike plate and stared out over the sea of upset faces. He contemplated the video pickup in the back of the hall, and smiled weakly at the several thousand colonists he knew would be watching the proceedings on the home net.

"Ladies and gentleman, if you'll please come to order." He waited a moment for the last of the whispering to die away, then, with a polite nod to the members of the Council seated on each side of him, addressed the hall at large.

"Most of you know, or have at least heard by word of mouth, the reasons behind tonight's meeting." There was a brief rise in the murmur and Karl waited patiently, letting it play out before continuing.

"We received yesterday new delivery orders from Earth and, confirming what many of the rumors have quoted, they want the production schedules increased again." Surprisingly, there was not an immediate uproar over the information, as he'd expected. His words were met instead with a cold staring and a simmering anger directed, he knew, not at him or the other members of the Council, but rather at the information he'd just given them. "Let me play back the message for you. For those of you watching at home, the message will be patched directly into the net."

He tapped a few keys on the terminal keyboard set into the table top, and the large screen behind him glowed a bright blue. In the center of the screen was the logo of the colony's planetary charter, below that the words: *BURST #57,293—17:25:13 PST / TO: Karl Manteo, Colony Chairman / FROM:*

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Johnson, R., Colonial Supervisor / RE: Colonial Status / (Personal, not for direct download.)

The screen remained for a few seconds, then dissolved into the image of a woman wearing an immaculately tailored business suit. She was about thirty, of slender build, and might have been attractive in any situation other than this one.

"Hello, Karl," she began, smiling. "I've got some great news for you. We've been going over the reports from all of you there on Carthage, and we're very pleased with your progress. You'll be happy to hear that you've even surpassed several of the ten-year colonies, and we couldn't be prouder of you.

"Now the good news: we've upgraded your status from Probationary to Second Class. That makes Carthage a full member of the Alliance. You've got a fine group there, Karl; my congratulations.

"I'm appending the new production schedules to this burst. Please give my best to Lynn and the kids. Talk to you soon."

A long list of figures, schedules, and shipping dates scrolled up the screen, but the hall broke into loud confusion before any serious discussion of the tables could begin.

"Order!" Karl was on his feet, and had to bang the gavel several times to restore quiet to the heated chamber. "If you would prefer to watch the proceedings from the privacy of your own homes, I can very easily dismiss this public session and continue with only the members of the council present." He paused to let the threat sink in then, satisfied they knew he meant business, sat back down. "That's better. Now, will there be an *orderly* discussion of the situation?" Several hands shot up, and Karl pointed the gavel at a man in the second row he recognized as Jerry Waller, Carthage shipping director. It would be Waller's unhappy task to get the new schedules implemented, and see to it that the supply drones were loaded and programmed for their destination coordinates.

"With all due respect," he said, addressing the Council members in a deadpan Texas drawl everyone who regularly attended Council sessions had come to know and love. "I think we oughta get the bitch on the line right now, and tell her to blow her new schedules out her ass." He paused a beat, then added, "Respectfully."

The hall erupted with overwhelming laughter and approval while Karl and the other members of the council attempted, with varying degrees of success, to hide their own amusement.

"Thanks, Jerry. Opinion noted and recorded."

"And seconded!" someone in the back shouted, rekindling the laughter.

"And seconded," Karl said, grateful to Jerry for providing a needed break in the tension. As the laughter subsided, he called on another raised hand, then another and another until the meeting finally broke up several hours later.

The five members of the Council sat grimly before the screen, chatting idly as they awaited a reply. It had already been nearly twenty minutes since they'd sent the recorded burst requesting a real-time conference, and still there was no reply. Even allowing for the vagaries

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of tachyon-burst transmissions, it should not have taken that long for a response of some kind, even if only an acknowledgement that their request had been received. As they waited, the talk inevitably drifted back to the topic that had been discussed repeatedly during the three days that had passed since the public meeting.

"To hell with them," José Cabranes was saying. José was a huge man, a former beam-welder on the orbitals back home, and had a way of talking with his fist, pounding it on the table to accentuate his words. "We've worked hard to make this place livable, to make it into our home. But there's so much more to do, and the increased production orders will only keep us from growing."

Nods and words of agreement echoed the man's sentiments. Although their responses were more tempered—and far less emotional—than José's fist on the table top, their meaning was no less clear.

"He's right, Karl." Cheryl Kolovitz stared at her note pad and fidgeted with a pencil as she spoke. The words seemed to come hard, as if it had taken a great deal of thought and determination to come to this decision. She dropped her hands to her lap and sat straighter in the chair before continuing. "I've met or spoken with nearly everyone in my borough, and it's almost unanimous. The Colonial Review Board is choking us, holding us back."

"But we can meet the schedule," Karl interrupted. "We've met every increase they've given us so far—"

"Met them?" spat Tay Sanders, representative from the northern settlement. They turned abruptly to face the new speaker. "Met them? We've *exceeded* them on occasion! All this was our own fault, too, if you ask me. You do more, you give extra effort, and they come to expect it." Tay stood, disgusted, and walked briskly to a table in the corner of the room, refilling his empty mug from a small coffee urn.

Karl turned to Glen Prinson. The Council member from Oceanview, Carthage's easternmost borough, had remained silent through most of the meeting. Taking the cue, Prinson said simply, "We have to do it, Karl. We all know it, whether we say it out loud or not. Whether we discuss it officially, in or out of public Council, or not."

Karl scanned the faces in the room. Tay, still standing near the coffee urn, nodded solemnly over his cup. José, his massive, tanned arms crossed defiantly in front of him, stared silently. Cheryl glanced once at Glen then turned back to Karl, her lips moved briefly in a soundless "Yes."

Karl sighed heavily and was about to reply to the group, but stopped as the screen glowed blue. The charter logo, burst number, and message title appeared briefly, then dissolved into the face of Rita Johnson. As always, the colonial supervisor looked fresh, alert; but it was easy to see the strain in her eyes. She had recorded the message with a wider angle, and it was also easy to see that she wasn't alone in her office. Another man, his clothing not quite a uniform but no less official-looking, sat next to her. Neither looked happy to be making the recording.

"Hello, Karl," she began. She sounded sure of herself, but after deal-

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ing with her for nearly a decade Karl knew her well enough to get the distinct impression that the confidence was practiced, not natural. "And hello to the rest of you. I've just finished viewing your burst—for the second time—and have to admit that I'm disturbed by the tone of your request for an immediate conference. I hope you don't mind, but because of my concerns I've taken the liberty of asking a representative of the Review Board to join me." She looked to her companion, and Karl sensed that she was relieved to be turning things over to him.

The man sat rigidly in his chair and set a thin folder on the desk before beginning. "Thank you, Miss Johnson. Mr. Manteo, in return for granting this conference so quickly, per your request, I hope you and the other representatives to the Carthage Council will return the favor by speaking freely. The faster we bring whatever problem you have into the open, the faster we'll be able to arrive at a mutually satisfactory conclusion."

The woman turned to face them once more. "Well, I—" She hesitated a second, then continued. Although the hesitation was instantaneous, it was obvious to Karl and the others that she'd paused the recording momentarily before continuing. "I hope we can answer your questions. In the interests of time, please confine the remarks in your initial transmission to a statement of grievances. We'll be waiting for your next burst."

The image dissolved to blue, displaying the end-of-recording message and burst number in the center of the screen before it dimmed. Nearly a minute passed before anyone spoke.

A low whistle from José broke the silence. "I get the feeling the lady means business."

"Yeah," agreed Karl. "But who the hell is *he?*"

Tay returned to the table and leaned over Karl's shoulder. Tapping the chairman's keyboard briefly, he replayed the burst in fast forward, freezing the image just before the stranger had started speaking. Clicking a few more keys, he called up an Alliance personnel file from the main computer records. "Damn," he whispered when the computer matched an ID to the picture. "Gene Williamson. He's not just a board member, he's board director. She must've read an awful lot into our request for a conference."

Karl looked from one to another, forcing a grim smile. "Any of you suppose she's been expecting this?" Without waiting for an answer, he tapped quickly at the keyboard, entering the necessary commands to set up a burst recording. He stopped, an index finger poised over one of the keys.

"Ready?" Satisfied that they were, he cleared his throat and punched the key. A small red light glowed on the lens mounted at the top of the screen.

"Hello Rita, Mr. Williamson. We at Carthage feel that your most recent request for an increase in production and shipping schedules is both excessive and unfair. Further, it is the determination of the Council that adhering to such a schedule would seriously undermine morale, efficiency, and productivity, and retard the proper growth and development of Carthage.

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"Be it resolved that we insist on an immediate retraction of the new schedule for a period of no less than five Earth-standard years.

"We hereby request an immediate real-time conference to discuss our concerns."

Karl briefly studied each of the Council members, noting the mixed look of conviction and apprehension on their faces, then confronted the screen once more.

"Uh, I guess that's it. Thank you." He stopped the recording and hurriedly keyboarded the procedure to encode and date it, then send it out in a burst through the colony's tachyon transmitter. Karl sat back wearily in his chair, and let out a heavy sigh. "Well, we've done it now."

"Yeah," said Glen. "Now I know how Fletcher Christian must have felt." There were nervous chuckles of agreement, which faded almost immediately as the screen came suddenly to life.

Stand by for real-time transmission, read the screen. *Conference linkup will be completed in approximately one minute.* The group waited in silence as Karl's terminal beeped several times in acknowledgement that a link had been established.

Rita Johnson and Williamson appeared on the screen. "Hello Karl," Rita said simply. "Let's begin."

The picture was somewhat distorted, and as the two spoke and moved the transmission would periodically slow down—sometimes to the point of stopping—then speed up again as if trying to catch up. Unlike recorded bursts, where the computer would account for variances in tachyon velocity and equalize speed for a normal playback, there was no way to compensate during a real-time link.

"We've anticipated your request," Williamson began, "and have given it our full attention. Consider, Mr. Manteo and members of the Carthage Council, that new colonies are being established at an increasing rate, and materials are urgently needed throughout the Alliance. Your status has been studied, and the board has determined the new schedule to be both fair and manageable. Certainly, the other colonies are willing to accept their share; is Carthage any different? I regret to inform you that your request for suspension of schedule increases has been denied."

Karl scanned the faces of the Council members and raised an eyebrow to each that asked a silent "Well?"

"Do it," Cheryl said softly.

A slow, wordless nod from Glen.

"Sí," agreed José.

Tay's face spread in a determined smile as he made it unanimous. "We're behind you, Karl."

Karl pursed his lips and took a deep breath.

"Let the record show that Carthage hereby refuses the new schedule."

Williamson motioned for her to lean close and the two spoke quietly for several long moments. As Karl watched and waited, it wasn't clear if the two were uncertain how to respond to the colony's overt threat of mutiny, or if the delay was caused by transmission speeds. Not that it mattered at this point.

Disturbed by something Williamson must have said, Rita drew suddenly away from him, raising her voice at the

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screen. "Karl, you don't know what you're saying! Please reconsider—"

"Miss Johnson," Williamson interrupted, "I'll assume full authority at this point." He faced them grimly, folding his hands solemnly on the desk top in front of him. "Mr. Manteo, members of the Council; I'm willing to give you the benefit of the doubt here, and assume that your last statement was garbled by transmission. Could you please repeat yourself?"

"Thanks for the opportunity to recant, Mr. Williamson, but you heard us correctly. We refuse."

It was almost amusing to Karl to watch the anger spread over the man's face. Even in the occasional distortion of the image it was plain the man had turned beet red.

"You can *not* refuse!" he shouted, slapping the folder on the desk. Rita put a hand to his arm in an attempt to calm him but he violently shook it off. "The Alliance will, will—"

"Will what?" Karl demanded. "What will the Alliance do?" He realized his hands were shaking and he forced himself to take several long, deep breaths. *My, God,* he thought. *What are we doing?*

"Karl," Tay whispered urgently, drawing his attention away from the screen. "Stand firm. Don't back down."

Karl reinforced his resolve and returned his gaze to Williamson, who had sat down again but still appeared to be fuming and groping for words.

"What *can* the Alliance do?" Karl repeated, inwardly pleased that his voice felt steady and even again, that nearly all traces of the nervousness he'd felt moments earlier were now gone. "We're too far away for you to mount an effective reprisal. I'm sure the Alliance has better things to do than make a fourteen-year trip out here just to kick our butts for disobedience. Even if you had a ship at the next nearest colony, we're *still* talking seven or eight years. It wouldn't be worth it."

"I see." Williamson seemed to have regained most of his composure and sat, hands folded again, facing the screen. "And we're supposed to just sit here and take orders from a colony that has only now risen above probationary status?"

"No, damn it," Tay interjected. He looked at Karl, who nodded for him to continue. "It's not like that at all. We're simply asking that the current schedule be maintained a while longer. We'll continue to meet quotas; the drones will continue to be launched on schedule."

Words of agreement echoed around the table as Cheryl spoke up. "He's right. We're not requesting special treatment, per se, it's just that—" She paused as the image on the screen stretched and froze, and waited for the speed-up to bring it back to normal before going on. "It's just that the new schedules will stifle active growth of the colony itself." She leaned back, a look of nervous satisfaction on her face.

"Thanks, Cheryl," Karl said, then looked at each member in turn. Tay gave him a thumbs-up; Glen smiled broadly. Even big José, his arms still crossed defiantly, allowed an uncharacteristic grin. "Thank you all." He regarded the screen again, nodded briefly at Rita, then stared into Williamson's dark eyes. "That's our position," he finished simply.

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Karl waited, but Williamson made no immediate response. Instead, he opened the folder before him and made a few notations to the sheets it contained. As Rita watched, her eyes widening in surprised shock, he signed several of the sheets, then passed them to her. "Sign these, please, Miss Johnson."

She glanced over the papers, her mouth open. "But sir, we can't—"

"Sign them!" Rita took a pen from the holder on her desk and went through the papers, signing each one in turn. Without a word, Williamson scooped up the sheets and checked them. He selected one of the sheets and gave it to her for her files, then replaced the others in the folder before standing abruptly. Buttoning his jacket, he looked squarely at Karl for a moment before allowing his gaze to sweep over the other members of the Council. He gave an amused snort and shook his head.

"You want time to grow?" he asked sarcastically. "Well, you just got all the time you need. Have fun." He turned sharply away and disappeared off the side of the image as Rita watched him stalk out of the room.

"Rita! What's he talking about?"

She addressed the screen immediately, shaking the piece of paper in front of her. "My God, Karl. Do you know what this is? It's a suspension order."

Karl sighed heavily. "Yeah. I suspected as much." He looked at Tay and, without bothering to turn back to the screen, added, "We knew loss of status was a possibility. We accepted the risk."

"No! You don't understand," she pleaded. "This is a *contact* suspension order." She waited for what she was saying to sink in before continuing. "That means *all* contact, until such time as you agree to the new schedule."

"Lady," José cut in, "what are you talkin' about?"

"Unless you agree to the schedule within . . ." she quickly scanned the sheet, found the figure she wanted, ". . . eighteen hours, all communications with Carthage will be immediately suspended."

José started to say something else but Karl raised a hand to stop him. "Define 'all.' "

"That means *all* communications!" She shook her head in frustration. "The communication nets, the entertainment and education feeds, news and information, all of it. But more importantly, even update information directly fed into the colony computer system will be cut off. Think of it, Karl: New medical and technological info will cease. You'll lose all software updates and technical revisions for every system and piece of equipment you've got. Do you understand?"

"And the tachyon link itself?"

"The link with your transmitter will be maintained indefinitely." She paused, lowering her voice. "Look, we don't *want* to lose Carthage. Contact us anytime you agree to the schedule. Relations will be restored and you'll get a status review—I won't lie to you, though, it'll be the toughest review we can dish out. It'll be five or ten years before you get off probationary."

"Give us a moment." He touched a key on the terminal, cutting the room audio pickup so they could talk freely. "Comments?"

Tay was the first to speak out. "That's

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it? They just ignore us and let us go?" He shook his head doubtfully. "It's too easy."

"How?" demanded José. "I say we go for it."

"No, Tay's right," Glen replied. "It doesn't matter how far out we are. They don't need to come here to 'kick our butts,' as you put it earlier, Karl."

"Why not?"

"Look, suppose they wanted to hit us, slap us down hard for defying them. The moment we give them our final answer, they could download a burst into the system that wipes all our medical programs or weather sats. Worse yet, suppose they burst in a bunch of garbage that reprograms *everything* we've got, right down to the secondary power systems and mechanical controls for the farm tractors. We'd have the backups, sure, but it'd be years before we cleared the faulty data from the main system."

"Jesus," Karl said softly. "And I always thought ruling an interstellar empire with an iron fist was impossible because of the distances involved. You're right, they could kill us all if they wanted to without ever setting foot on the planet."

"Karl," Rita said, her patience apparently wearing thin, "if you call this off, right now, I think I can convince Williamson to withdraw the order with no status penalty." He glanced at the screen briefly and held up a finger for her to stand by, then turned back to Glen.

"What about the other colonies? Could we set up a link with one of them?"

Glen considered it a moment, then said, "We could, but it'd be dangerous. Once they find out our status they won't want to be seen as cooperating with us, and one word from them to Williamson and he could route anything he wanted through them, right into our system."

That's it, then, he thought. *We'd be totally on our own.* Karl's brow furrowed deeply as he made a decision. He touched the keyboard and addressed the screen. "Uh, you make some good points. We need to think about it, though; take it to the people. We've got till . . ." he glanced at his watch, surprised at how much time had elapsed since they'd first requested the conference, ". . . what, five tomorrow afternoon, your time?"

"Yes," she said, relief spreading across her features.

"No penalty if we reconsider?" She shook her head curtly, tossing her golden hair attractively as she did.

"No. No penalty."

"All right, you'll have our answer before then." He smiled at her, adding, "Thanks, Rita, for all your personal attention on this. I owe you one."

She returned his smile. "Hey, that's what I'm here for. I'll talk to you tomorrow."

Karl tapped several keys and the screen faded. He let out a long, slow breath and wearily rubbed his eyes with the backs of his hands.

"Cheryl," he said, still rubbing tired eyes, "you and Tay organize an emergency session for tonight, nine o'clock. I think we're going to have a lot of explaining to do."

"Done," Tay replied, the tone of his voice implying that he understood. The two immediately went to separate terminals and started the process of in-

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forming Carthage's five boroughs of the hastily-called special session.

Karl got up slowly and walked wordlessly from the room. It was late dusk, and once outside the meeting hall Karl realized that the air had grown chilly. He stood at the steps of the hall and stared down the well-trimmed footpath leading to Central Village. Lights were coming on in the small town now, he noticed, and here and there a curl of smoke could be seen rising from the colonist's homes.

A cool breeze played through his hair as he looked into the night sky. It was growing dark quickly, and it was in that brief period of time after sunset and before the first of Carthage's twin moons rose over the horizon that the stars twinkled most brightly overhead. A throat cleared behind him and he realized that the other two men had followed him outside.

"Glen, you're the astronomy buff," he said, gazing upward. "Where's Sol?"

The man stared into the northern sky, studied the stars a moment, then extended an arm. José and Karl both looked to where he pointed. "There, just to the left of that triangular grouping. That's home."

Karl took a deep breath, savoring the salty smell of the ocean as the wind picked up from the east. "No," he said finally. "No, this is home." He looked down the footpath once more.

"Let's go cut the goddamned link."

Williamson sat behind his desk and stared at the screen on the opposite wall. The huge screen took up nearly the entire wall, floor to ceiling, and displayed a dozen horizontal rows, each row consisting of a dozen rectangular sections that functioned as individual viewscreens. A number of them were blank, but each of the remaining screens glowed with its own set of readout windows and informational graphs. His examination of the screen was interrupted by a soft knock on his door.

"Come in, Rita," he said without bothering to take his eyes off the screen. He indicated a chair next to his desk as she entered, and she sat quietly.

"Which one is Carthage?" she asked.

"Third row, screen five. Notice the lower power readings." She leaned forward in her seat, squinting at the display. "Sorry," he said, smiling, "I'm used to reading them all together." Using his desk terminal, he moved a blinking cursor to the section he'd indicated and tapped a few keys. The selected screen expanded and became a larger window that took up most of the center of the wall display, making the readouts easier to see.

A beautiful blue-green planet rotated slowly in a graphics window at the upper left of the enlarged screen, with numerous readouts arrayed below and to the right side of the window.

"Notice readout number seven, on the right."

She scanned the image, quickly locating the figures. "They've started a power-down on the tachyon dish. They're really going to do it, aren't they?"

"Don't worry. I've gone over your report quite extensively, and agree with your assessment that Carthage is ready to be cut loose. Manteo's a good man, and he's chosen good people. They'll do fine." He turned to face her, smiling

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softly. "Oh, nice job on those reports, by the way."

She blushed briefly, and was about to thank him for the compliment when something on the screen suddenly caught her attention.

The Carthage window flickered, steadied momentarily, then blinked out. The window remained empty for a few seconds, then disappeared, replaced by the entire screen again. The fifth screen in the third row was now blank.

"Congratulations, Rita," Williamson said, "I think we've just become parents."

She said nothing, and continued staring at the blank screen in the third row.

"Hey, are you all right? Don't worry about them, they'll do fine."

She laughed softly. "I know," she said, a bit embarrassed at how sentimental she always got after cutting loose one of the colonies. "They always do, Gene. It's just so damned hard kicking them out of the nest." ■

IN TIMES TO COME

● In the September 1941 issue of this magazine (then called *Astounding*), there appeared a story called "Nightfall," which catapulted young Isaac Asimov into the front ranks of science fiction writers—where he has remained ever since. Our next issue marks the 50th anniversary of that occasion. Appropriately enough, the feature story, with cover by Broeck Steadman, is Isaac Asimov's "Gold," a memorable novelette written especially for this issue. It is not a sequel to "Nightfall"; indeed, there are no prerequisites at all for reading and enjoying it. However, if you happen to know something about Isaac's life and career, you will no doubt recognize something "extra" in it that's uniquely special and personal. . . .

Kevin J. Anderson offers a rather unusual fact article which also looks back, in its own way, to a time when this country was busy developing weapons it later decided were better not used. So what do you do with them? Hint: the title of the article is "Beating Warheads Into Plowshares"—but that's not necessarily as easy as it might sound.

We'll also have stories by Paula Robinson, Julia Ecklar, and Don Sakers; and, of course, Part III of Lois McMaster Bujold's *Barrayar*.

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The Alternate View

COSMIC VOIDS AND GREAT WALLS

John G. Cramer

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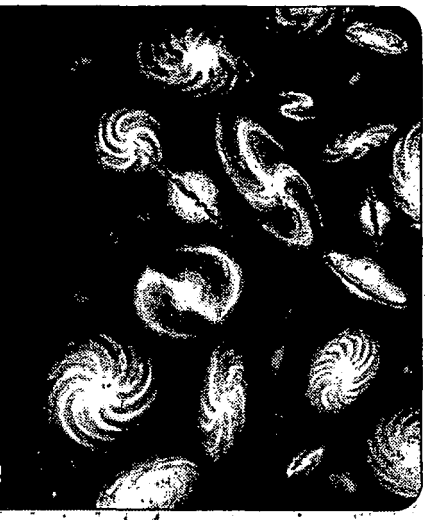

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Our Universe, as it turns out, is an even stranger place that we thought. A few years ago, astronomers studying the large scale structure of the Universe announced the discovery of a "Cosmic Void," a vast region of space hundreds of millions of light-years across, that is almost completely empty of stars and galaxies. More recently another group discovered a "Great Wall," a sheet of galaxies and galactic clusters half a billion light-years across.

A recent front page headline in the *New York Times* announced "Astronomers' New Data Jolt Vital Part of Big Bang Theory." Newly analyzed data from the Infrared Astronomical Satellite, the *Times* reported, show conclusively that these vast structures are not isolated oddities. Instead, the structures are normal features of our Universe, which has an intrinsic lumpiness that is far larger and more uneven than can be reconciled with the best current theories about when and how our Universe formed.

In this Alternate View column I want to discuss this latest crisis in cosmology, which is causing a reexamination of our ideas about the Universe and its formation. The developing "standard model" of cosmology has been required to account for a number of facts about the Universe: (1) it's here, (2) it's expanding, (3) we observe light elements (helium, lithium) that, we assume, were produced very early in its formation, (4) we observe very uniform microwave radiation that, we assume, was produced fairly early in its formation, (5) the gravitational pull of the mass present in the Universe very nearly balances the kinetic energy of its expansion, and (6) there are galaxies and galactic clusters that represent a "lumpiness" of the Universe at a scale of about 10^4 light-years. The standard cosmological model, which bears the ungainly label

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of "The New Inflationary Big Bang Scenario with Cold Dark Matter" had been able to account, at least qualitatively, for all of these facts. We thought we were on the road to gaining a good understanding of how the Universe came to be.

However, the new observations now demand that we add yet another item to this list: (7) there are cosmic voids and walls that represent a second lumpiness of the Universe at a scale of about 10^9 light-years. The trouble with this new observation is that it cannot be gracefully accommodated by the standard model. The vast size of the new large-scale structures is troubling, because in the accepted age of the Universe, about 12 to 18 billion years, there isn't time for such large objects to form. The age of the Universe is also in doubt.

But before we discuss this new set of problems for cosmologists, let me describe what the standard model has to say about how the Universe formed. Our Universe, according to the standard model, began its existence with a very rapid exponential expansion for the first fraction of a second, before slowing to a more modest expansion rate. This had the effect of making the present day Universe very smooth and uniform. It also tied its present expansion rate to its present mass-energy content, and stuck a density balance that synthesized about the right quantities of light elements. Thus the standard model was successful in dealing with items 1, 2, 3, 4, and 5 on the list above.

That leaves Item 6: galaxy formation. That required an extra assumption beyond the exponentially expanding Big Bang. The gravitational pull of matter causes a sort of "curdling" effect in smooth matter distribution. It tends to clump. When cosmologists first tried using computers to model the formation of galaxies through this curdling effect, they encountered a big problem: the gravitational force just isn't strong enough to pull together galaxies in the 15 billion years or so since the process started. This was very puzzling, until Dark Matter was discovered.

Astronomers using the Doppler shift to measure the speeds of bright stars orbiting clusters of galaxies discovered that these orbital speeds were much too fast. There was much more mass in the galaxies than counting stars and correcting for non-luminous gas would predict. The general conclusion, which is now supported by many unrelated observations, is that the bulk of the mass in our Universe is "dark matter," some unknown stuff that clumps together early in the evolution of the Universe, pulling normal matter along with it, causing galaxies and stars to form, and otherwise remaining out of sight. Only about 0.5% of the mass of an average galaxy is accounted for by visible stars. Most of the remaining 99.5% is mysterious dark matter.

With the addition of the extra gravitational force provided by dark matter, the computer simulations of galaxy formation began to work. The galaxies formed on the computer screens formed at about the right time and were about the right size. But the simulations worked only if the dark matter was "cold," in that it was deposited in the Universe with no initial speed or temperature. This meant that one of the most likely dark matter candidates, neu-

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trinos with non-zero rest mass, were excluded because they were produced by thermal process in the heat of the early Big Bang.

And this, until a few years ago, was where things stood. The standard model accounted for all six items on the list, at one level or another, and cosmologists were beginning to feel that they were on the way to a deep and fundamental understanding of how our Universe came to be.

The new evidence that the Universe is full of super-structures and companion super-voids has destroyed this optimism and complacency. The curdling effect of cold dark matter, because it is relatively localized, cannot produce such structures as The Great Wall. The formation of these large structures requires an additional mechanism. And now cosmologists are in disagreement about how this might be done.

One approach is to assume that the Big Bang was not so homogeneous as the standard model would suggest, and that the large structures are a reflection of some initial chaotic inhomogeneities in the early Universe. This approach, if it can be made to work, must be able to deal with the amazing uniformity of the cosmic microwave background. New data from the COBE satellite has shown no deviation from smooth spatial uniformity in this radiation, which was produced only 100,000 years after the Big Bang itself.

Another possibility is to introduce "hot dark matter" to the recipe. There is some preliminary data from the USSR/US germanium solar neutrino detector suggesting that neutrinos may have a non-zero rest mass (I'll save a detailed discussion of this for a later column). Massive neutrinos, if the mass is in the right range, can produce just the kind of wall and void structures observed. However, they cannot produce galaxy formation as well. Thus, as one prominent astrophysicist put it, one needs to call on the Tooth Fairy twice, once to make cold dark matter for galaxy formation and once again to make hot dark matter for walls and voids. That is at least one call too many for many cosmologist wielders of Occam's Razor.

An alternative approach to the problem uses the cosmological constant, a venerable concept that calls up a bit of history. In the early 1920s when Albert Einstein began to apply his general theory of relativity to the Universe as a whole, he discovered a problem. His beautiful equations told him that every Universe he considered was dynamically unstable. They all collapsed on themselves from the gravitational pull of the mass they contained. In those days the "steady state" model of the Universe was standard, and no one suspected that the Universe was expanding. So Einstein, in order to stabilize his recalcitrant equations, added a "cosmological constant" that offset the pull of gravity. Effectively it gave empty space a slight negative energy density that caused large scale repulsion to offset the large scale attraction of gravity. The Universe could then hang in a delicate balance of offsetting attraction and repulsion for eternity, in agreement with steady-state cosmology.

A few years later Edwin Hubble, studying the Doppler shift of distant galaxies, discovered the expansion of the

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Universe. Einstein immediately realized that he should have believed his equations. He should not have added the "bugger factor" of the cosmological constant, which is not needed to describe a Universe in the process of dynamic expansion. He later called the cosmological constant his greatest mistake.

These days, however, the cosmological constant has had a modest revival. Theorists like Steven Hawking and Sidney Coleman are approaching the problem of quantizing gravity by considering a space filled with four-dimensional wormholes. They have realized that it is not easy to make the cosmological constant, which represents the intrinsic energy density of empty space, equal to zero. Slight twitches of parameters can make the energy density negative (as Einstein did) or positive (so that it adds to the pull of gravity).

With the discovery of cosmic walls and voids, some cosmologists have seized on the latter form. Giving space a slight positive energy density can, if it is done right, add a large scale tendency to curdle which could explain the observed structures. Cosmologists pursuing this approach are seeking some way of setting this cosmological constant as a natural consequence of the overall process rather than having to put it into the model "by hand." There is some promise that the initial inflation process could do this.

If space itself should possess a nonzero energy, as would be implied by this approach, does that have science-fictional implications? Perhaps. In a recent AV column ("FTL Photons," *Analog*, Mid-December, 1990) I discussed the Casimir effect, an experimental demonstration that the energy content of space is reduced in the gap between two electrically neutral conducting plates. To those who are not comfortable with negative energy density, the Casimir effect becomes a bit easier to swallow if the "normal" energy density of space is greater than zero. And could one extract the excess energy from space itself, perhaps leaving a trail of negative energy space bubbles? SF writers like Asimov, Clarke, and Forward have already suggested such possibilities.

In any case, cosmology has just become much more interesting. Its practitioners have a large and nearly indigestible lump of new data to chew on. It's going to be fascinating to see how our view of the Universe changes when this new information is included in an improved cosmological model. ■

REFERENCE

"Large Scale Structure of the Universe," John Noble Wilford, *New York Times*, page A-1 (January 3, 1991).

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BARRAYAR

Lois McMaster Bujold

Part II of IV

What seems normal to any culture may seem quite bizarre to another. And strangeness is seldom welcome. . . .

Ron and Val Lakey Lindahn

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SYNOPSIS

I am afraid, thinks **Cordelia.** *The new Lady Vorkosigan of the planet Barrayar, formerly Captain Cordelia Naismith of the Betan Astronomical Survey, has reason to be uneasy. She left her homeworld of Beta Colony, after its recent war with Barrayar, to marry* **Admiral Lord Aral Vorkosigan.** *Aral had resigned his commission, disgusted by the secret and lethal politics behind the war. But he has been hooked out of retirement by the dying* **Emperor Ezar** *and appointed Regent to the four-year-old heir* **Prince Gregor** *and his mother,* **Princess Kareen.** *Aral takes up his new duties determined to serve honorably.*

Included in Aral's household are two former soldiers, **Lieutenant Koudelka,** *crippled by nerve disruptor fire and now serving as personal secretary to the new Lord Regent, and the strange* **Sergeant Bothari,** *victim of a draconian memory wipe for his crimes during the war, and of dubious mental balance.*

Aral and Cordelia visit Princess Kareen and Gregor. Kareen sends Cordelia a gift—her female bodyguard, the tall blonde **Droushnakovi,** *who is fascinated by Cordelia's history as a female soldier. Cordelia, newly pregnant and worried about Barrayar's primitive standards of medicine, welcomes her company. They go shopping and Cordelia buys a swordstick, which she presents to Koudelka, who is touchy about his handicaps: mutation-scarred Barrayar is brutal to the physically imperfect.*

Aral's father, the aged **General Count Piotr Vorkosigan,** *arrives from the country to attend the ceremonies heralding the new regency. Escorted to the visitor's gallery by Aral's cousin* **Captain Lord Padma Vorpatril,** *Cordelia watches the Joint Council Vote to confirm Aral's appointment. There she meets two young Vor lords,* **Evon** *and* **Carl Vorhalas;** *their acquaintance begins badly when Carl denigrates the crippled Koudelka, but they repair the breach.*

Ezar dies, and Gregor becomes emperor. Cordelia meets Padma's wife **Alys Vorpatril,** *also pregnant, and tries to blend into Barrayaran Vor society. Droushnakovi falls in love with Koudelka, but Kou, jealous of her physical abilities, so like those he has lost, and secretly worried about impotence from his injuries, rebuffs her.*

Aral survives an assassination attempt when a sonic grenade narrowly misses his groundcar. The assassin escapes unidentified. Cordelia's fear and sense of isolation grow.

At the Emperor's birthday dinner at the Imperial Residence, a highly ceremonial function, Cordelia has a strange encounter with **Count Vidal Vordarian,** *who reveals what he clearly imagines is damaging information about Aral's sexual past. Since Cordelia knows it already, she is baffled by Vordarian's venom, till she realizes it is an oblique attack on Aral through her. Count Vordarian is also trying to court Princess Kareen. Disturbed, Cordelia privately asks Aral's personal security commander,* **Simon Illyan,** *to take a closer look at Vordarian.*

PART II

CHAPTER SIX

Cordelia watched the shadow of the

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lightflyer flow over the ground below, a slim blot arrowing south. The arrow wavered across farm fields, creeks, rivers, and dusty roads—the road net was rudimentary, stunted, its development leapfrogged by the personal air transport that had arrived in the blast of galactic technology at the end of the Time of Isolation. Coils of tension unwound in her neck with each kilometer they put between themselves and the hectic hothouse atmosphere of the capital. A day in the country was an excellent idea, overdue. She only wished Aral could have shared it with her.

Sergeant Bothari, cued by some landmark below, banked the lightflyer gently to its new course. Droushnakovi, sharing the back seat with Cordelia, stiffened, trying not to lean into her. Dr. Henri, in front with the sergeant, stared out the canopy with an interest almost equal to Cordelia's.

Dr. Henri turned half around, to speak over his shoulder to Cordelia. "I do thank you for the luncheon invitation, Lady Vorkosigan. It's a rare privilege to visit the Vorkosigans's private estate."

"Is it?" said Cordelia. "I know they don't have crowds, but Count Piotr's horse friends drop in fairly often. Fascinating animals." Cordelia thought that over a second, then decided Dr. Henri would realize without being told that the "fascinating animals" applied to the horses, and not Count Piotr's friends. "Drop the least little hint that you're interested, and Count Piotr will probably show you personally around the stable."

"I've never met the general." Dr. Henri looked daunted by the prospect, and fingered the collar of his undress greens. A research scientist from the Imperial Military Hospital, Henri dealt with high rankers often enough not to be awed; it had to be all that Barrayaran history clinging to Piotr that made the difference.

Piotr had acquired his present rank at the age of twenty-two, fighting the Cetagandans in the fierce guerrilla war that had raged through the Dendarii Mountains, just now showing blue on the southern horizon. Rank was all then-emperor Dorca Vorbarra could give him at the time; more tangible assets such as reinforcements, supplies, and pay were out of the question in that desperate hour. Twenty years later Piotr had changed Barrayaran history again, playing kingmaker to Ezar Vorbarra in the civil war that had brought down Mad Emperor Yuri. Not your average HQ staffer, General Piotr Vorkosigan, not by anybody's standard.

"He's easy to get along with," Cordelia assured Dr. Henri. "Just admire the horses, ask a few leading questions about the wars, and you can relax and spend the rest of your time listening."

Henri's brows went up, searching her face for irony. Henri was a sharp man. Cordelia smiled cheerfully.

Bothari was silently watching her in the mirror set over his control interface, Cordelia noticed. Again. The sergeant seemed tense today. It was the position of his hands, the cording of the muscles in his neck, that gave him away. Bothari's flat yellow eyes were always unreadable; set deep, too close together, and not quite on the same level, above his sharp cheekbones and long narrow jaw. Anxiety over the doctor's visit?

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Understandable.

The land below was rolling, but soon rucked up into the rugged ridges that channeled the lake district. The mountains rose beyond, and Cordelia thought she caught a distant glint of early snow on the highest peaks. Bothari hopped the flyer over three running ridges, and banked again, zooming up a narrow valley. A few more minutes, a swoop over another ridge, and the long lake was in sight. An enormous maze of burnt-out fortifications made a black crown on a headland, and a village nestled below it. Bothari brought the flyer down neatly on a circle painted on the pavement of the village's widest street.

Dr. Henri gathered up his bag of medical equipment. "The examination will only take a few minutes," he assured Cordelia, "then we can go on."

Don't tell me, tell Bothari. Cordelia sensed Dr. Henri was a little unnerved by the sergeant.

Bothari led them to a little house set in a narrow side street that went down to the glimmering water. At his knock, a heavy-set woman with greying hair opened the door and smiled. "Good morning, Sergeant. Come in, everything's all ready. Milady." She favored Cordelia with an awkward curtsey.

Cordelia returned a nod, gazing around with interest. "Good morning, Mistress Hysopi. How nice your house looks today." The place was painfully scrubbed and straightened—as a military widow, Mistress Hysopi understood all about inspections.

"Your little girl's been very good this morning," Mistress Hysopi assured the sergeant. "Took her bottle right down—she's just had her bath. Right this way, Doctor. I hope you'll find everything's all right. . . ."

She guided the way up the narrow stairs. One bedroom was clearly her own; the other, with a bright window looking down over rooftops to the lake, had recently been made over into a nursery. A dark-haired infant with big brown eyes cooed to herself in a crib. "There's a girl," Mistress Hysopi smiled, picking her up. "Say hi to your Daddy, eh, Elena? Pretty-pretty."

Bothari entered no further than the door, watching the infant warily. "Her head has grown a lot," he offered after a moment.

"They usually do, between three and four months," Mistress Hysopi agreed.

Dr. Henri laid out his instruments on the crib sheet, and Mistress Hysopi carried the baby back over and began undressing her. The two began a technical discussion about formulae and feces, and Bothari walked round the little room, looking but not touching. He did look terribly huge and out of place among the bright and delicate infant furnishings, dark and dangerous in his brown and silver uniform. His head brushed the slanting ceiling, and he backed cautiously to the door.

Cordelia hung curiously over Henri and Hysopi's shoulders, watching the little girl wriggle and attempt to roll. Infants. Soon enough she would have one of those. As if in response her belly fluttered. Piotr Miles was not, fortunately, strong enough to fight his way out of a paper bag yet, but if his development continued at this rate, the last couple of months were going to be sleepless. She wished she'd taken the parents' training course back on Beta

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Colony even if she hadn't been ready to apply for a license. Yet Barrayaran parents seemed to manage to ad lib. Mistress Hysopi had learned on the job, and she had three grown children now.

"Amazing," said Dr. Henri, shaking his head and recording his data. "Absolutely normal development, as far as I can tell. Nothing to even show she came out of a uterine replicator."

"*I* came out of a uterine replicator," Cordelia noted with amusement. Henri glanced involuntarily up and down at her, as if suddenly expecting to find antennae sprouting from her head. "Betan experience suggests it doesn't matter so much how you got here, as what you do after you arrive."

"Really." He frowned thoughtfully. "And you are free of genetic defects?"

"Certified," Cordelia agreed.

"We *need* this technology." He sighed, and began packing his things back up. "She's fine, you can dress her again," he added to Mistress Hysopi.

Bothari loomed over the crib at last, to stare down, the lines creased deep between his eyes. He touched the infant only once, a finger to her cheek, then rubbed thumb and finger together as if checking his neural function. Mistress Hysopi studied him sideways, but said nothing.

While Bothari lingered to settle up the month's expenses with Mistress Hysopi, Cordelia and Dr. Henri strolled down to the lake, Droushnakovi following.

"When those seventeen Escobaran uterine replicators first arrived at ImpMil," said Henri, "sent from the war zone, I was frankly appalled. Why save those unwanted fetuses, and at such a cost? Why land them on my department? Since then I've become a believer, milady. I've even thought of an application, spin-off technology, for burn patients. I'm working on it now, the project approval came down just a week ago." His eyes were eager, as he detailed his theory, which was sound as far as Cordelia understood the principles.

"My mother is a medical equipment and maintenance engineer at Silica Hospital," she explained to Henri, when he paused for breath and approval. "She works on these sorts of applications all the time." Henri redoubled his technical exposition.

Cordelia greeted two women in the street by name, and politely introduced them to Dr. Henri.

"They're wives of some of Count Piotr's sworn armsmen," she explained as they passed on.

"I should have thought they'd choose to live in the capital."

"Some do, some stay here. It seems to depend on taste. The cost of living is much lower out here, and these fellows aren't paid as much as I'd imagined. Some of the backcountry men are suspicious of city life, they seem to think it's purer here." She grinned briefly. "One fellow has a wife in each location. None of his brother-armsmen have ratted on him yet. A solid bunch."

Henri's brows rose. "How jolly for him."

"Not really. He's chronically short of cash, and always looks worried. But he can't decide which wife to give up. Apparently, he actually loves them both."

When Dr. Henri stepped aside to talk

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to an old man they saw pottering about the docks about possible boat rentals, Droushnakovi came up to Cordelia, and lowered her voice. She looked disturbed.

"Milady . . . how in the world did Sergeant Bothari come by a baby? He's not married, is he?"

"Would you believe the stork brought her?" said Cordelia lightly.

"No."

From her frown, Drou did not approve of this levity. Cordelia hardly blamed her. She sighed. *How do I wriggle out of this one?* "Very nearly. Her uterine replicator was sent on a fast courier from Escobar, after the war. She finished her gestation in a laboratory in ImpMil, under Dr. Henri's supervision."

"Is she really Bothari's?"

"Oh, yes. Genetically certified. That's how they identified—" Cordelia snapped that last sentence off mid way. Carefully, now . . .

"But what was all that about seventeen replicators? And how did the baby get in the replicator? Was—was she an experiment?"

"Placental transfer. A delicate operation, even by galactic standards, but hardly experimental. Look." Cordelia paused, thinking fast. "I'll tell you the truth." *Just not all of it.* "Little Elena is the daughter of Bothari and a young Escobaran officer named Elena Visconti. Bothari . . . loved her . . . very much. But after the war, she would not return with him to Barrayar. The child was conceived, er . . . Barrayaran-style, then transferred to the replicator when they parted. There were some similar cases. The replicators were all sent to ImpMil, which was interested in learning more about the technology. Bothari was in . . . medical therapy, for quite a long time, after the war. But when he got out, and she got out, he took custody of her."

"Did the others take their babies too?"

"Most of the other fathers were dead by then. The children went to the Imperial Service orphanage." There. The official version, all right and tight.

"Oh." Drou frowned at her feet. "That's not at all . . . it's hard to picture Bothari . . . to tell the truth," she said in a burst of candor, "I'm not sure I'd want to give custody of a pet cat to Bothari. Doesn't he strike you as a bit strange?"

"Aral and I are keeping an eye on things. Bothari's doing very well so far, I think. He found Mistress Hysopi on his own, and is making sure she gets everything she needs. Has Bothari—that is, does Bothari bother you?"

Droushnakovi gave Cordelia an are-you-kidding? look. "He's so big. And ugly. And he . . . mutters to himself, some days. And he's sick so much, days in a row when he won't get out of bed, but he doesn't have a fever or anything. Count Piotr's armsman-commander thinks he's malingering."

"He's not malingering. But I'm glad you mentioned it; I'll have Aral talk to the commander and straighten him out."

"But aren't you at all afraid of him? On the bad days, at least?"

"I could weep for Bothari," said Cordelia slowly, "but I don't fear him. On the bad days or any days. You

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shouldn't either. It's . . . it's a profound insult."

"Sorry." Droushnakovi scuffed her shoe across the gravel. "It's a sad story. No wonder he doesn't talk about the Escobar war."

"Yes, I'd . . . appreciate it if you'd refrain from bringing it up. It's very painful for him."

A short hop in the lightflyer from the village, across a tongue of the lake, brought them to the Vorkosigans's country estate. A century ago the house had been an outlying guard post to the headland's fort. Modern weaponry had rendered above-ground fortifications obsolete, and the old stone barracks had been converted to more peaceful uses. Dr. Henri had evidently been expecting more grandeur, for he said, "It's smaller than I expected."

Piotr's housekeeper had a pleasant luncheon set up for them on a flower-decked terrace off the south end of the house by the kitchen. While she was escorting the party out, Cordelia fell back beside Count Piotr.

"Thank you, sir, for letting us invade you."

"Invade me indeed! This is your house, dear. You are free to entertain any friends you choose in it. This is the first time you've done so, do you realize?" He stopped, standing with her in the doorway. "You know, when my mother married my father, she completely redecorated Vorkosigan House. My wife did the same in her day. Aral married so late, I'm afraid an updating is sadly overdue. Wouldn't you . . . like to?"

But it's *your* house, thought Cordelia helplessly. Not even Aral's really. . . .

"You've touched down so lightly on us, one almost fears you'll fly away again." Piotr chuckled, but his eyes were concerned.

Cordelia patted her rounding belly. "Oh, I'm thoroughly weighted down now, sir." She hesitated. "To tell the truth, I have thought it would be nice to have a lift tube in Vorkosigan House. Counting the basement, sub-basement, attic, and roof, there are eight floors in the main section. It can make quite a hike."

"A lift tube? We've never—" he bit his tongue. "Where?"

"You could put it in the back hallway next to the plumbing stack, without disrupting the internal architecture."

"So you could. Very well. Find a builder. Do it."

"I'll look into it tomorrow, then. Thank you, sir." Her brows rose, behind his back.

Count Piotr, evidently with the same idea in mind of encouraging her, was studiously cordial to Dr. Henri over lunch, New Man though Henri clearly was. Henri, following Cordelia's advice, hit it off well with Piotr in turn. Piotr told Henri all about the new foal, born in his stables over the back ridge. The creature was a genetically-certified pure-blood that Piotr called a *quarter horse*, though it looked like an entire horse to Cordelia. The stud-colt had been imported at great cost as a frozen embryo from Earth, and implanted in a grade mare, the gestation supervised anxiously by Piotr. The biologically-trained Henri expressed technical interest, and after lunch was done Piotr carried him off for a personal inspection of

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the big beasts.

Cordelia begged off. "I think I'd like to rest a bit. You can go, Drou. Sergeant Bothari will stay with me." In fact, Cordelia was worried about Bothari. He hadn't eaten a single bite of lunch, nor said a word for over an hour.

Doubtful, but madly interested in the horses, Drou allowed herself to be persuaded. The three trudged off up the hill. Cordelia watched them away, then turned her face back to catch Bothari watching her again. He gave her a strange approving nod.

"Thank you, milady."

"Ahem. Yes. I wondered if you felt ill."

"No . . . yes. I don't know. I wanted . . . I've wanted to talk to you, milady. For—for some weeks. But there never seemed to be a good time. Lately it's been getting worse. I can't wait any more. I'd hoped today—"

"Seize the moment." The housekeeper was rattling about in Piotr's kitchen. "Would you care to take a walk, or something?"

"Please, milady."

They walked together, around the old stone house. The pavilion on the crest of the hill, overlooking the lake, would be a great place to sit and talk, but Cordelia felt too full and pregnant to make the climb. She led left, instead, on the path parallel to the slope, till they came to what appeared to be a little walled garden.

The Vorkosigan family plot was crowded with an odd assortment of graves, core family, distant relatives, retainers of special merit. The cemetery had originally been part of the ruined fort complex, the oldest graves of guards and officers going back centuries. The Vorkosigan intrusion dated only from the atomic destruction of the old district capital of Vorkosigan Vashnoi during the Cetagandan invasion. The dead had been melted down with the living there, then eight generations of family history obliterated. It was interesting to note the clusters of more recent dates, and key them to their current events: the Cetagandan invasion, Mad Yuri's War. Aral's mother's grave dated exactly to the start of Yuri's War. A space was reserved beside her for Piotr, and had been for thirty-three years. She waited patiently for her husband. *And men accuse us women of being slow.* Her eldest son, Aral's brother, lay buried at her other hand.

"Let's sit over there," she nodded toward a stone bench set round with small orange flowers, and shaded by an Earth-import oak at least a century old. "These people are all good listeners, now. And they don't pass on gossip."

Cordelia sat on the warm stone, and studied Bothari. He sat as far from her as the bench permitted. The lines on his face were deep-cut today, harsh despite the muting of the afternoon light by the warm autumn haze. One hand, wrapped around the rough stone edge of the bench, flexed arrhythmically. His breathing was too careful.

Cordelia softened her voice. "So, what's the trouble, Sergeant? You seem a little . . . stretched, today. Is it something about Elena?"

He breathed a humorless laugh. "Stretched. Yes. I guess so. It's not about the baby . . . it's . . . well, not directly." His eyes met hers squarely for almost the first time today. "You

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remember Escobar, milady. You were there. Right?"

"Right." *This man is in pain,* Cordelia realized. What sort of pain?

"I can't remember Escobar."

"So I understand. I believe your military therapists went to a great deal of trouble to make sure you did not remember Escobar."

"Oh yes."

"I don't approve of Barrayaran notions of therapy. Particularly when colored by political expediency."

"I've come to realize that, milady." Cautious hope flickered in his eyes.

"How did they work it? Burn out selected neurons? Chemical erasure?"

"No . . . they used drugs, but nothing was destroyed. They tell me. The doctors called it suppression-therapy. We just called it hell. Every day we went to hell, till we didn't want to go there any more." Bothari shifted in his seat, his brow wrinkling. "Trying to remember—to talk about Escobar at all—gives me these headaches. Sounds stupid, doesn't it? Big man like me whining about headaches like some old woman. Certain special parts, memories, they give me these really bad headaches that make red rings around everything I see, and I start vomiting. When I stop trying to think about it, the pain goes away. Simple."

Cordelia swallowed. "I see. I'm sorry. I knew it was bad, but I didn't know it was . . . that bad."

"The worst part is the dreams. I dream of . . . it . . . and if I wake up too slowly, I remember the dream. I remember too much, all at once, and my head—all I can do is roll over and cry, until I can start thinking about something else. Count Piotr's other armsmen—they think I'm crazy, they think I'm stupid, they don't know what I'm doing in there with them. *I* don't know what I'm doing in there with them." He rubbed his big hands over his burr-scalp in a harried swipe. "To be a count's sworn armsman—it's an honor. Only twenty places to fill. They take the best, they take the bloody heroes, the men with medals, the twenty-year-men with perfect records. If what I did—at Escobar—was so bad, why did the Admiral make Count Piotr make a place for me? And if I was such a bloody hero, why did they take away my memory of it?" His breath was coming faster, whistling through his long yellow teeth.

"How much pain are you in now? Trying to talk about this?"

"Some. More to come." He stared at her, frowning deeply. "I've got to talk about this. To you. It's driving me . . ."

She took a calming breath, trying to listen with her whole mind, body and soul. And carefully. So carefully. "Go on."

"I have . . . four pictures . . . in my head, from Escobar. Four pictures, and I cannot explain them. To myself. A few minutes, out of—three months? Four? They all bother me, but one bothers me the most. You're in it," he added abruptly, and stared at the ground. Both hands clenched the bench now, white-knuckled.

"I see. Go on."

"One—the least-bad one—it was an argument. Prince Serg was there, and Admiral Vorrutyer, Lord Vorkosigan, and Admiral Rulf Vorhalas. And I was

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there. Except I didn't have any clothes on."

"Are you sure this isn't a dream?"

"No. I'm not sure. Admiral Vorrutyer said . . . something very insulting, to Lord Vorkosigan. He had Lord Vorkosigan backed up against the wall. Prince Serg laughed. Then Vorrutyer kissed him, full on the mouth, and Vorhalas tried to knock Vorrutyer's head off, but Lord Vorkosigan wouldn't let him. And I don't remember after that."

"Um . . . yeah," said Cordelia. "I wasn't there for that part, but I know there was some really weird stuff going on in the high command at that point, as Vorrutyer and Serg pushed their limits. So it's probably a true memory. I could ask Aral, if you wish."

"No! No. That one doesn't feel as important, anyway. As the others."

"Tell me about the others, then."

His voice fell to a whisper. "I remember Elena. So pretty. I only have two pictures in my head, of Elena. One, I remember Vorrutyer making me . . . no, I don't want to talk about that one." He stopped for a full minute, rocking gently, forward and back. "The other . . . we were in my cabin. She and I. She was my wife. . . ." his voice faltered. "She wasn't my wife, was she." It wasn't even a question.

"No. But you know that."

"But I remember *believing* she was." His hands pressed his forehead, and rubbed his neck, hard and futilely.

"She was a prisoner of war," said Cordelia. "Her beauty drew Vorrutyer and Serg's attention, and they made a project of tormenting her, for no reason—not for her military intelligence, not even for political terrorism—just for their gratification. She was raped. But you know that, too. On some level."

"Yes," he whispered.

"Taking away her contraceptive implant and allowing—or compelling—you to impregnate her was part of their idea of sadism. The first part. They did not, thank God, live long enough to get to the second part."

His legs had drawn up, his long arms wrapped around them in a tight, tight ball. His breathing was fast and shallow, panting. His face was freezer-burn white, sheened with cold sweat.

"Do I have red rings around me now?" Cordelia asked curiously.

"It's all . . . kind of pink."

"And the last picture?"

"Oh, milady." He swallowed. "Whatever it was . . . I know it must be very close to whatever it is they most don't want me to remember." He swallowed again. Cordelia began to understand why he hadn't touched lunch.

"Do you want to go on? *Can* you go on?"

"I *must* go on. Milady. Captain Naismith. Because I remember you. Remember seeing you. Stretched out on Vorrutyer's bed, all your clothes cut away, naked. You were bleeding. I was looking up your . . . What I want to know. Must know." His arms were wrapped around his head, now, tilted toward her on his knees, his face hollow, haunted, hungry.

His blood pressure must be fantastically high, to drive that monstrous migraine. If they went too far, pressed this through to the last truth, might he be in danger of a stroke? An incredible piece of psychoengineering, to program his own body to punish him for his forbid-

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den thoughts. . . .

"Did I rape *you,* milady?"

"Huh? *No!*" She sat bolt upright, fiercely indignant. They had taken *that* knowledge away from him? They'd *dared* take that away from him?

He began to cry, if that's what that ragged breathing, tight-screwed face, and tears leaking from his eyes meant. Equal parts agony and joy. "Oh. Thank. God." And, "Are you *sure* . . . ?"

"Vorrutyer ordered you to. You refused. Out of your own will, without hope of rescue or reward. It got you in a hell of a lot of trouble, for a little while." She longed to tell him the rest, but the state he was in now was so terrifying, it was impossible to guess the consequences. "How long have you been remembering this? Wondering this?"

"Since I first saw you again. This summer. When you came to marry Lord Vorkosigan."

"You've been walking around for over *six months* with this in your head, not daring to ask—?"

"Yes, milady."

She sat back, horrified, her breath trickling out between pursed lips. "Next time, don't wait so long."

Swallowing hard, he stumbled to his feet, a big hand waving in a desperate wait-for-me gesture. He swung his legs over the low stone wall, and found some bushes. Anxiously, she listened to him dry-vomiting his empty stomach for several minutes. An extremely bad attack, she judged, but finally the violent paroxysms slowed, then stopped. He returned, wiping his lips, looking very white and not much better, except for his eyes. A little life flickered in those eyes now, a half-suppressed light of overwhelming relief.

The light faded, as he sat in thought. He rubbed his palms on his trouser knees, and stared at his boots. "But I'm not less a rapist, just because you were not my victim."

"That is correct."

"I can't . . . trust myself. How can you trust me? . . . Do you know what's better than sex?"

She wondered if she could take one more sharp turn in this conversation without running off screaming. *You encouraged him to uncork, now you're stuck with it.* "Go on."

"Killing. It feels even better, afterwards. It shouldn't be . . . such a pleasure. Lord Vorkosigan doesn't kill like that." His eyes were narrowed, brows creased, but he was uncurled from his ball of agony; he must be speaking generally, Vorrutyer no longer on his mind.

"It's a release of rage, I'd guess," said Cordelia cautiously. "How did you get so much rage balled up inside of you? The density is palpable. People can sense it."

His hand curled, in front of his solar plexus. "It goes back a long way. But I don't feel angry, most of the time. It snaps out suddenly."

"Even Bothari fears Bothari," she murmured in wonder.

"Yet you don't. You're less afraid even than Lord Vorkosigan."

"I see you as bound up with him, somehow. And he's my own heart. How can I fear my own heart?"

"Milady. A bargain."

"Hm?"

"You tell me . . . when it's all right.

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To kill. And then I'll know."

"I can't—look, suppose I'm not there? When that sort of thing lands on you, there usually isn't time to stop and analyze. You have to be allowed self-defense, but you also have to be able to discern when you're really being attacked." She sat up, eyes widening in sudden insight. "That's why your uniform is so important to you, isn't it? It tells you when it's all right. When you can't tell yourself. All those rigid routines you keep to, they're to tell you you're all right, on track."

"Yes. I'm sworn to the defense of House Vorkosigan, now. So *that's* all right." He nodded, apparently reassured. By what, for God's sake?

"You're asking me to be your conscience. Make your judgments for you. But you are a whole man. I've seen you make right choices, under the most absolute stress."

His hands pressed to his skull again, his narrow jaw clenching, and he grated out, "But I can't *remember* them. Can't remember how I did it."

"Oh." She felt very small. "Well . . . whatever you think I can do for you, you've got a blood-right to it. We owe you, Aral and I. We remember why, even if you can't."

"Remember it for me, then, milady," he said lowly, "and I'll be all right."

"Believe it."

CHAPTER SEVEN

Cordelia shared breakfast, one morning the following week, with Aral and Piotr in a private parlor overlooking the back garden. Aral motioned to the Count's footman, who was serving.

"Would you please rout out Lieutenant Koudelka for me? Tell him to bring that agenda for this morning that we were discussing."

"Uh, I guess you hadn't heard, my lord?" murmured the man. Cordelia had the impression that his eyes were searching the room for an escape route.

"Heard what? We just came down."

"Lieutenant Koudelka is in hospital this morning."

"Hospital! Good God, why wasn't I told at once? What happened?"

"We were told Commander Illyan would be bringing a full report, my lord. The guard commander . . . thought he'd wait for him."

Alarm struggled with annoyance on Vorkosigan's face. "How bad is he? It's not some . . . delayed after-effect of the sonic grenade, is it? What happened to him?"

"He was beaten up, my lord," said the footman woodenly.

Vorkosigan sat back with a little hiss. A muscle jumped in his jaw. "You get that guard commander in here," he growled.

The footman evaporated instantly, leaving Vorkosigan tapping a spoon nervously and impatiently on the table. He met Cordelia's horrified eyes and produced a small false smile of reassurance for her. Even Piotr looked startled.

"Who could possibly want to beat up Kou?" asked Cordelia wonderingly. "That's sickening. He couldn't fight back worth a damn."

Vorkosigan shook his head. "Someone looking for a safe target, I suppose. We'll find out. Oh, we will find out."

The green-uniformed ImpSec guard commander appeared, to stand at atten-

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tion. "Sir."

"For your future information, and you may pass it on, should any accident occur to any of my key staff members, I wish to be informed at once. Understood?"

"Yes, sir. It was quite late when word got back here, sir. And since we knew by then that they were both going to live, Commander Illyan said I might let you sleep. Sir."

"I see." Vorkosigan rubbed his face. "Both?"

"Lieutenant Koudelka and Sergeant Bothari, sir."

"They didn't get into a fight, did they?" asked Cordelia, now thoroughly alarmed.

"Yes. Oh—not with each other, milady. They were set upon."

Vorkosigan's face was darkening. "You had better begin at the beginning."

"Yes, sir. Um. Lieutenant Koudelka and Sergeant Bothari went out last night. Not in uniform. Down to that area in back of the old caravansary."

"My God, what for?"

"Um." The guard commander glanced uncertainly at Cordelia. "Entertainment, I believe, sir."

"Entertainment?"

"Yes, sir, Sergeant Bothari goes down there about once a month, on his duty-free day, when my lord Count is in town. It's apparently some place he's been going to for years."

"In the caravansary?" said Count Piotr in an unbelieving tone.

"Um," the guard commander eyed the footman in appeal.

"Sergeant Bothari isn't very particular about his entertainment, sir," the footman volunteered uneasily.

"Evidently not!" said Piotr.

Cordelia questioned Vorkosigan with her eyebrows.

"It's a very rough area," he explained. "I wouldn't go down there myself without a patrol at my back. Two patrols, at night. And I'd definitely wear my uniform, though not my rank insignia. . . . but I believe Bothari grew up there. I imagine it looks different to his eyes."

"Why so rough?"

"It's very poor. It was the town center during the Time of Isolation, and it hasn't been touched by renovation yet. Minimal water, no electricity, choked with refuse—"

"Mostly human," added Piotr tartly.

"Poor?" said Cordelia, bewildered. "No electricity? How can it be on the comm network?"

"It's not, of course," answered Vorkosigan.

"Then how can anybody get their schooling?"

"They don't."

Cordelia stared. "I don't understand. How do they get their jobs?"

"A few escape to the Service. The rest prey on each other, mostly." Vorkosigan regarded her face uneasily. "Have you no poverty on Beta Colony?"

"Poverty? Well, some people have more money than others, of course, but . . . no comconsoles?"

Vorkosigan was diverted from his interrogation. "Is not owning a comconsole the lowest standard of living you can imagine?" he said in wonder.

"It's the first article in the constitution. 'Access to information shall not be

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abridged.' "

"Cordelia . . . these people barely have access to food, clothing, and shelter. They have a few rags and cooking pots, and squat in buildings that aren't economical to repair or tear down yet, with the wind whistling through the cracks in the walls."

"No air conditioning?"

"No heat in the winter is a bigger problem, here."

"I suppose so. You people don't really have summer. How do they call for help when they're sick or hurt?"

"What help?" Vorkosigan was growing grim. "If they're sick, they either get well or die."

"Die, if we're lucky," muttered Piotr. "Vermin."

"You're not joking." She stared back and forth between the pair of them. "That's horrible. . . . why, think of all the geniuses you must be missing!"

"I doubt we're missing very many, from the caravansary," said Piotr dryly.

"Why not? They have the same genetic complement as you," Cordelia pointed out the, to her, obvious.

The Count went rigid. "My dear girl! They most certainly do not! My family have been Vor for nine generations."

Cordelia raised her eyebrows. "How do you know, if you didn't have gene typing till eighty years ago?"

Both the guard commander and the footman were acquiring peculiar stuffed expressions. The footman bit his lip.

"Besides," she went on reasonably, "if you Vors got around half as much as those histories I've been reading imply, 90 percent of the people on the planet must have Vor blood by now. Who knows who your relatives are on your fathers' sides?"

Vorkosigan bit his linen napkin absently, his eyes gone crinkly with much the same expression as the footman, and murmured, "Cordelia, you can't . . . you really *can't* sit at the breakfast table and imply my ancestors were bastards. It's a mortal insult here."

Where should I sit? "Oh. I'll never understand that, I guess. Oh, never mind. Koudelka, and Bothari."

"Quite. Go on, duty officer."

"Yes, sir. Well, sir, they were coming back, I was told, about an hour after midnight, when they were set on by a gang of area toughs. Evidently Lieutenant Koudelka was too well dressed, and besides there's that walk of his, and the stick . . . anyway, he attracted attention. I don't know the details, sir, but there were four deaths and three in the hospital this morning, in addition to the ones that got away."

Vorkosigan whistled, very faintly, through his teeth. "What was the extent of Bothari and Koudelka's injuries?"

"They . . . I don't have an official report, sir. Just hearsay."

"Say, then."

The duty officer swallowed a little. "Sergeant Bothari has a broken arm, some broken ribs, internal injuries, and a concussion. Lieutenant Koudelka, both legs broken, and a lot of, uh . . . shock burns." His voice trailed off.

"What?"

"Evidently—I heard—their assailants had a couple of high-voltage shock sticks, and they discovered they could get some . . . peculiar effects on his prosthetic nerves with them. After they'd broken his legs they

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spent . . . quite a long time working him over. That's how it was Commander Illyan's men caught up with them. They didn't clear off in time."

Cordelia pushed her plate away and sat trembling.

"Hearsay, eh? Very well. Dismissed. See that Commander Illyan is sent to me immediately when he arrives." Vorkosigan's expression was introspective and grim.

Piotr's was sourly triumphant. "Vermin," he asserted. "You ought to burn them all out."

Vorkosigan sighed. "Easier to start a war than finish it. Not this week, sir."

Illyan attended on Vorkosigan within the hour, in the library, with his informal verbal report. Cordelia trailed in after them, to sit and listen.

"Sure you want to hear this?" Vorkosigan asked her quietly.

She shook her head. "Next to you, they are my best friends here. I'd rather know than wonder."

The duty officer's synopsis proved tolerably accurate, but Illyan, who had talked to both Bothari and Koudelka at the Imperial Military Hospital where they had been taken, had a number of details to add, in blunt terms. His puppy-dog face looked unusually old this morning.

"Your secretary was apparently seized with a desire to get laid," he began. "Why he picked Bothari as a native guide, I can't imagine."

"We three are the sole survivors of the *General Vorkraft*," Vorkosigan replied. "It's a bond, I suppose. Kou and Bothari always got on well, though. He appeals to Bothari's latent fatherly instincts, maybe. And Kou's a clean-minded boy—don't tell him I said that, he'd take it as an insult. It's good to be reminded such people still exist. Wish he'd come to me, though."

"Well, Bothari did his best," said Illyan. "Took him to this dismal dive, which I gather has a number of points in its favor from Bothari's point of view. It's cheap, it's quick, and nobody talks to him. It's also far removed from Admiral Vorrutyer's old circles. No unpleasant associations. He has a strict routine. According to Kou, Bothari's regular woman is almost as ugly as he is. Bothari likes her, it appears, because she never makes any noise. I don't think I want to think about that.

"Be that as it may, Kou got mismatched with one of the other employees, who terrified him. Bothari says he asked for the best girl for him—hardly a girl, woman, whatever—and apparently Kou's needs were misinterpreted. Anyway, Bothari was done and kicking his heels waiting while Kou was still trying to make polite conversation and being offered an assortment of delights for jaded appetites he'd never heard of before. He gave up and fled back downstairs at last, where Bothari was by this time pretty thoroughly tanked. He usually has one drink and leaves, it seems.

"Kou, Bothari, and this whore then got into an argument over payment, on the grounds that he'd burned up enough time for four customers versus—most of this won't be in the official report, all right?—she couldn't get his circuits working. Kou forked over a partial payment—Bothari's still grumbling over how much, insofar as he can talk at all through that mouth of his this morn-

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ing—and they retreated in disorder, a lousy time having been had by all."

"The first obvious question that arises," said Vorkosigan, "is, was the attack ordered by anyone from that establishment?"

"To the best of my knowledge, no. I threw a cordon around the place, once we'd found it, and questioned everyone inside under fast-penta. Scared the shit out of them all, I'm glad to say. They're used to Count Vorbohn's municipal guards, whom they bribe, or who blackmail them, and vice versa. We turned up a lot of information on petty crimes, none of which was of the least interest to us—do you want me to pass it on to the municipals, by the way?"

"Hm. If they're innocent of the attack, just file it. Bothari may want to go back there someday. Do they know why they were questioned?"

"Certainly not! I insist my men work clean. We're here to gather information, not pass it out."

"My apologies, Commander. I should have known. Carry on."

"Well, they left the place about an hour after midnight, on foot, and took a wrong turn somewhere. Bothari's pretty upset about that. Thinks it's his fault, for getting so drunk. Bothari and Koudelka both say they saw movements in the shadows for about ten minutes before the attack. So they were stalked, apparently, until they were maneuvered into a high walled alley, and found themselves with six in front and six behind.

"Bothari pulled his stunner and fired—got three, before he was jumped. Someone down there is richer by a good service stunner this morning. Kou had his swordstick, but nothing else.

"They ganged up on Bothari first. He took out two more, after he'd lost the stunner. They stunned him, then tried to beat him to death after he was down. Kou had been using his stick as a quarterstaff up till then, but at that point he popped the cover off. He says now he wished he hadn't, because this murmur of 'Vor!' went up all around, and things got really ugly.

"He stabbed two, until somebody struck the sword with a shock stick, and his hand went into spasms. The five that were left sat on him and broke both his legs backwards at the knees. He asked me to tell you it wasn't as painful as it sounds. He says they broke so many circuits he had hardly any sensation. I don't know if that's true."

"It's hard to tell with Kou," said Vorkosigan. "He's been concealing pain for so long, it's almost second nature. Go on."

"I have to jump back a bit now. My man, who was assigned to Kou, followed them down into that warren by himself. He wasn't one of the men who was familiar with the place, supposedly, and he wasn't dressed for it—Kou had two reservations for some live musical performance last night, and until three hours before midnight that's where we thought he was going. My man went in there and vanished, between the first and second hourly checks. That's what has me going this morning. Was he murdered? Or kidnapped? Rolled and raped? Or was he a plant, a set-up, a double agent? We won't know till we find the body, or whatever.

"Thirty minutes after the missed

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check my people sent in the other tail. But he was looking for the first man. Kou was uncovered for three solid bloody hours last night before my night-shift supervisor came on duty and woke to the fact. Fortunately, Kou'd spent most of that time in Bothari's old whore's retirement home.

"My night-shift man, whom I commend, redirected the field agent, and put a patrol in the air to boot. So when the field agent finally got to that revolting scene, he was able to call a flyer down on top of it almost immediately, and drop half a dozen of my uniformed bruisers in to break up the party. That business with the shock sticks—it was bad, but not as bad as it might have been. Kou's assailants evidently lacked the sort of, hm, imaginative approach that, say, the late Admiral Vorrutyer might have had in the same situation. Or maybe they just didn't have time to get really refined."

"Thank God," murmured Vorkosigan. "And the deaths?"

"Two were Bothari's work, clean blows, one was Kou's—cut him across the neck—and one, I'm afraid, was mine. The kid went into anaphylactic shock in an allergic reaction to fast-penta. We zipped him over to ImpMil, but they couldn't get him going again. I don't like it. They're autopsying him now, trying to find out if it was natural or a planted defense against questioning."

"And the gang?"

"Appears to be a perfectly legitimate—if that's the word—caravansary mutual benefit society. According to the survivors we captured, they decided to pick on Kou because he 'walked funny.' Charming. Although Bothari wasn't exactly walking in a straight line, either. None of the ones we captured is an agent for anybody but themselves. I cannot speak for the dead. I supervised the questioning personally, and will swear to it. They were quite shocked to find themselves of interest to Imperial Security."

"Anything else?" said Vorkosigan.

Illyan yawned behind his hand, and apologized. "It's been a long night. My night-shift man got me out of bed after midnight. Good man, good judgment. No, that about wraps it up, except for Kou's motivation for going down there in the first place. He went all vague, and started asking for pain medication, when we came to that subject. I was hoping you might have a suggestion, to ease my paranoias. Being suspicious of Kou gives me a crick in the neck." He yawned again.

"I do," said Cordelia, "but for your paranoia, not for your report, all right?"

He nodded.

"I think he's in love with someone. After all, you don't test something unless you're planning to use it. Unfortunately his test was a major disaster. I expect he'll be pretty depressed and touchy for quite some time."

Vorkosigan nodded understanding.

"Any idea who?" asked Illyan automatically.

"Yes, but I don't think it's your business. Especially if it's not going to happen."

Illyan shrugged acceptance, and left to pursue his lost sheep, the missing man who'd first been assigned to follow Koudelka.

* * *

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Sergeant Bothari was back at Vorkosigan House, though not yet back on duty, within five days, a plastic casing on the broken arm. He volunteered no information on the brutal affair, and discouraged curious questioners with a sour glower and noncommittal grunts.

Droushnakovi asked no questions and offered no comments. But Cordelia saw her occasionally cast a haunted look at the empty comconsole in the library, with its double-scrambled links to the Imperial Residence and the General Staff Headquarters, where Koudelka usually sat to work while at Vorkosigan House. Cordelia wondered just how much detail of that night's events had been poured, searing as lead, into her ears.

Lieutenant Koudelka returned to curtailed light duties the following month, apparently quite cheerful and unaffected by his ordeal. But in his own way he was as uninformative as Bothari. Questioning Bothari had been like questioning a wall. Questioning Koudelka was like talking to a stream; one got back babble, or little eddies of jokes, or anecdotes that pulled the current of discussion inexorably away from the original subject. Cordelia responded to his sunniness with automatic good grace, playing along with his obvious desire to slide over the affair as lightly as possible. Inwardly she was far more doubtful.

Her own mood was not the best. Her imagination returned again and again to the assassination scare of six weeks ago, dwelling uncomfortably on the chances that had almost taken Vorkosigan from her. Only when he was with her was she completely at ease, and he was gone more and more now. Something was brewing at Imperial HQ. He had been gone four times to all-night sessions, and had taken a trip without her, some flying inspection of military affairs, of which he gave her no details and from which he returned white-tired around the eyes. He came in and out at odd hours. The flow of military and political gossip and chit-chat with which he was wont to entertain her at meals, or undressing for bed, dried up to an uncommunicative silence, though he seemed to need her presence no less.

Where would she be without him? A pregnant widow, without family or friends, bearing a child already a focal point of dynastic paranoias, inheritor of a legacy of violence. Could she get offplanet? And where would she go if she could? Would Beta Colony ever let her come back?

Even the autumn rain, and the fat lingering greenness of the city parks, began to fail to please her. Oh, for a breath of really dry desert air, the familiar alkali tang, the endless flat distances. Would her son ever know what a real desert was? The horizons here, crowded close with buildings and vegetation, seemed almost to rise around her like a huge wall at times. On really bad days the wall seemed to topple inward.

She was holed up in the library one rainy afternoon, curled on an old high-backed sofa, reading, for the third time, a page in an old volume from the Count's shelves. The book was a relic of the printer's art from the Time of Isolation. The English in which it was written was printed in a mutant variation of the Cyrillic alphabet, all forty-six characters of it, once used for all

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tongues on Barrayar. Her mind seemed unusually mushy and unresponsive to it today. She turned out the light and rested her eyes a few minutes. With relief, she observed Lieutenant Koudelka enter the library and seat himself; stiffly and carefully, at the comconsole. *I shan't interrupt him; he at least has real work to do,* she thought, not yet returning to her page, but still comforted by his unconscious company.

He worked only for a moment or two, then shut down the machine with a sigh, staring abstractedly into the empty carved fireplace that was the room's original centerpiece, still not noticing her. *So I'm not the only one who can't concentrate. Maybe it's this strange grey weather. It does seem to have a depressing effect on people. . . .*

Picking up his swordstick, he ran a hand down the smooth length of its casing. He clicked it open, holding it firmly and releasing the spring silently and slowly. He sighted along the length of the gleaming blade, which almost seemed to glow with a light of its own in the shadowed room, and angled it, as if meditating on its pattern and fine workmanship. He then turned it end for end, point over his left shoulder and hilt away from him. He wrapped a handkerchief around the blade for a hold, and pressed it, very lightly, against the side of his neck over the area of the carotid artery. The expression on his face was distant and thoughtful, his grip on the blade as light as a lover's. His hand tightened suddenly.

Her indrawn breath, the first half of a sob, startled him from his reverie. He looked up to see her for the first time; his lips thinned and his face turned a dusky red. He swung the sword down. It left a white line on his neck, like part of a necklace, with a few ruby drops of blood welling along it.

"I . . . didn't see you, milady," he said hoarsely. "I . . . don't mind me. Just fooling around, you know."

They stared at each other in silence. Her own words broke from her lips against her will. "I hate this place! I'm afraid all the time, now."

She turned her face into the high side of the sofa, and, to her own horror, began to cry. *Stop it! Not in front of Kou of all people! The man has enough real troubles without you dumping your imaginary ones on him.* But she could not stop.

He levered himself up and limped over to her couch, looking worried. Tentatively, he seated himself beside her.

"Um . . ." he began. "Don't cry, milady. I was just fooling around, really." He patted her clumsily on the shoulder.

"Garbage," she choked back at him. "You scare the hell out of me." On impulse she transferred her tear-smeared face from the cold silken fabric of the sofa to the warm roughness of the shoulder of his green uniform. It tore a like honesty from him.

"You can't imagine what it's like," he whispered fiercely. "They pity me, you know? Even *he* does." A jerk of his head in no particular direction indicated Vorkosigan. "It's a hundred times worse than the scorn. And it's going to go on forever."

She shook her head, devoid of answer in the face of this undoubted truth.

"I hate this place too," he continued.

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"Just as much as it hates me. More, some days. So you see, you're not alone."

"So many people trying to kill him," she whispered back, despising herself for her weakness. "Total strangers . . . one of them is bound to succeed in the end. I think about it all the time, now." Would it be a bomb? Some poison? Plasma arc, burning away Aral's face, leaving no lips even to kiss goodbye?

His attention was drawn achingly from his pain to hers, brows drawing quizzically together.

"Oh, Kou," she went on, looking down blindly into his lap and stroking his sleeve. "No matter how much it hurts, don't do it to him. He loves you. . . . you're like a son to him, just the sort of son he always wanted. That," she nodded toward the sword laid on the couch, shinier than the silk, "would cut out his heart. This place pours craziness on him every day, and demands he give back justice. He can't do it except with a whole heart. Or he must eventually start giving back the craziness, like every one of his predecessors. And," she added in a burst of uncontrollable illogic, "it's so damn wet here! It won't be my fault if my son is born with *gills!*"

His arms encircled her in a kindly hug. "Are you . . . afraid of the childbirth?" he inquired, with a gentle and unexpected perceptiveness.

Cordelia went still, suddenly face to face with her tightly suppressed fears. "I don't trust your doctors," she admitted shakily.

He smiled in deep irony. "I can't blame you."

A laugh puffed from her, and she hugged him back, around the chest, and raised her hand to wipe away the tiny drops of blood from the side of his neck. "When you love someone, it's like your skin covers theirs. Every hurt is doubled. And I do love you so, Kou. I wish you'd let me help you."

"Therapy, Cordelia?" Vorkosigan's voice was cold, and cut like a stinging spray of rattling hail. She looked up, surprised, to see him standing before them, his face as frozen as his voice. "I realize you have a great deal of Betan . . . expertise, in such matters, but I beg you will leave the project to someone else."

Koudelka turned red, and recoiled from her. "Sir," he began, and trailed off, as startled as Cordelia by the icy anger in Vorkosigan's eyes. Vorkosigan's gaze flicked over him, and they both clamped their jaws shut.

Cordelia drew in a very deep breath for a retort, but released it only as a furious "Oh!" at Vorkosigan's back as he wheeled and stalked out, spine stiff as Kou's swordblade.

Koudelka, still red, folded into himself, and using his sword as a prop levered himself to his feet, his breath too rapid. "Milady. I beg your pardon." The words seemed quite without meaning.

"Kou," said Cordelia, "you know he didn't mean that hateful thing. He spoke without thinking. I'm sure he doesn't, doesn't—"

"Yes, I realize," returned Koudelka, his eyes blank and hard. "I am universally known to be quite harmless to any man's marriage, I believe. But if you will excuse me—milady—I do have

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some work to do. Of a sort."

"Oh!" Cordelia didn't know if she was more furious with Vorkosigan, Koudelka, or herself. She steamed to her feet and left the room, throwing her words back over her shoulder. "Damn all Barrayarans to hell anyway!"

Droushnakovi appeared in her path, with a timid, "Milady?"

"And you, you useless . . . frill," snarled Cordelia, her rage escaping helplessly in all directions now. "Why can't you manage your own affairs? You Barryaran women seem to expect your lives to be handed to you on a platter. It doesn't work that way!"

The girl stepped back a pace, bewildered. Cordelia contained her seething outrage, and asked more sensibly, "Which way did Aral go?"

"Why . . . upstairs, I believe, milady."

A little of her old and battered humor came to her rescue then. "Two steps at a time, by chance?"

"Um . . . three, actually," Drou replied faintly.

"I suppose I'd better go talk to him," said Cordelia, running her hands through her hair and wondering if tearing it out would have any practical benefit. "Son of a bitch." She did not know herself if that was expletive or description. *And to think I never used to swear.*

She trudged after him, her anger draining with her energy as she climbed the stairs. *This pregnancy business sure slows you down.* She passed a duty guard in the corridor. "Lord Vorkosigan go this way?" she asked him.

"To his rooms, milady," he replied, and stared curiously after her. *Great. Love it,* she thought savagely. *The old newlyweds, first real fight will have plenty of built-in audience. These old walls are not soundproof. I wonder if I can keep my voice down? Aral's no problem, when he gets mad he whispers.*

She entered their bedroom, to find him seated on the side of the bed, removing uniform jacket and boots with violent, jerky gestures. He looked up, and they glared at each other. Cordelia opened fire first, thinking, *Let's get this over with.*

"That remark you made in front of Kou was totally out of line."

"What, I walk in to find my wife . . . cuddling, with one of my officers, and you expect me to make polite conversation about the weather?" he bit back.

"You know it was nothing of the sort."

"Fine. Suppose it hadn't been me? Suppose it had been one of the duty guards, or my father. How would you have explained it then? You know what they think of Betans. They'd jump on it, and the rumors would never be stopped. Next thing I know, it would be coming back at me as political chaff. Every enemy I have out there is just waiting for a weak spot to pounce on. They'd love one like that."

"How the devil did we get onto your damned politics? I'm talking about a friend. I doubt you could have come up with a more wounding remark if you'd funded a study project. That was foul, Aral! What's the matter with you, anyway?"

"I don't know." He slowed, and rubbed his face tiredly. "It's the damn job, I expect. I don't mean to spill it on

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you."

Cordelia suspected that was as near as she could expect of an admission of his being in the wrong, and accepted it with a little nod, letting her own rage evaporate. She then remembered why the rage had felt so good, for the vacuum it left filled back up with fear.

"Yes, well . . . just how much do you fancy having to break down his door one of these mornings?"

Vorkosigan frowned at her, going still. "Do you . . . have some reason to believe he's thinking along suicidal lines? He seemed quite content to me."

"He would—to you." Cordelia let the words hang in the air a moment, for emphasis. "I think he's about that close." She held up thumb and forefinger a bare millimeter apart. The finger still had a smear of blood on it, and it caught her eye in unhappy fascination. "He was playing around with that blasted swordstick. I wish I'd never given it to him. I don't think I could bear it if he used it to cut his own throat. That—seemed to be what he had in mind."

Oh. Vorkosigan looked smaller, somehow, without his glittering military jacket, without his anger. He held out his hand to her, and she took it and sat beside him.

"So if you're having visions of, of playing King Arthur to our Lancelot and Guinevere in that—pig head of yours, forget it. It won't wash."

He laughed a little at that. "My visions were closer to home, I'm afraid, and considerably more sordid. Just an old bad dream."

"Yeah. I . . . guess it would hit a nerve at that." She wondered if the ghost of his first wife ever hovered by him, breathing cold death in his ear, as Vorrutyer's ghost sometimes did by her. He looked deathly enough. "But I'm Cordelia, remember? Not . . . anybody else."

He leaned his forehead against hers. "Forgive me, dear Captain. I'm just an ugly scared old man, and growing older and uglier and more paranoid every day."

"You, too?" She rested in his arms. "I take exception to the old and ugly part, though. Pig-headed did *not* refer to your exterior appearance."

"Thank you—I think."

It pleased her to amuse him even that little. "It is the job, isn't it?" she said. "Can you talk about it at all?"

His lips compressed. "In confidence—although that seems to be your natural state, I don't know why I bother to emphasize it—it looks like we could have another war on our hands before the end of the year. And we're not nearly well enough recovered for it, after Escobar."

"What! I thought the war party was half-paralyzed."

"Ours is. The Cetagandans's is still in good working order, however. Intelligence indicates they were planning to use the political chaos here following Ezar Vorbarra's death to cover a move on those disputed wormhole jump points. Instead they got me, and—well, I can hardly call it stability. Dynamic equilibrium, at best. Anyway, not the kind of disruption they were counting on. Hence that little incident with the sonic grenade. Negri and Illyan are now 70 percent sure it was Cetagandan work."

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"Will they . . . try again?"

"Almost certainly. But with or without me, consensus in the staff is that they'll be probing in force before the end of the year. And if we're weak—they'll just keep right on moving until they're stopped."

"No wonder you've been . . . abstracted."

"Is that the polite term for it? But no. I've known about the Cetagandans for some time. Something else came up today, after the Council session. A private audience. Count Vorhalas came to see me, to beg a favor."

"I'd think it would be your pleasure, to do a favor for Rulf Vorhalas's brother. I gather not?"

He shook his head unhappily. "The Count's youngest son, who is a hotheaded young idiot of eighteen who should have been sent to military school—you met him at the Council confirmation, as I recall—"

"Lord Carl?"

"Yes. He got into a drunken fight at a party last night."

"A universal tradition. Such things happen even on Beta Colony."

"Quite. But they stepped outside to settle their affair armed, each one, with a pair of dull swords that had been part of a wall decoration, and a couple of kitchen knives. That made it, technically, a duel with the two swords."

"Uh-oh. Was anyone hurt?"

"Unfortunately, yes. More or less by accident, I gather, in a scrambling fall, the count's son managed to put his sword through his friend's stomach and sever his abdominal aorta. He bled to death almost immediately. By the time the bystanders had gathered their wits sufficiently to get a medical team up there, it was much too late."

"Dear God."

"It was a duel, Cordelia. It began as a mockery, but it ended as the real thing. And the penalties for dueling apply." He rose, and paced the room, stopping by the window and staring out into the rain. "His father came to ask me for an Imperial pardon. Or, if I could not grant that, to see if I would get the charges changed to simple murder. If it were tried as a simple murder, the boy could plead self-defense, and possibly end up with a mere prison term."

"That seems . . . fair enough, I suppose."

"Yes." He paced again. "A favor for a friend. Or . . . the first crack in the door to let that hell-bred custom back into our society. What happens when the next case is brought before me, and the next, and the next? Where do I begin drawing the line? What if the next case involves some political enemy of mine, and not a member of my own party? Shall all the deaths that went into stamping this thing out be made void? I remember dueling, and what things were like back then. And worse—an entry point for government by friends, then cliques. Say what you will about Ezar Vorbarra, in thirty years of ruthless labor he transformed the government from a Vor-class club into some semblance, however shaky, of a rule of law, one law for everyone."

"I begin to see the problem."

"And me—me, of all men, to have to make that decision! Who should have been publicly executed twenty-two years ago for the selfsame crime!" He paused before her. "The story about last

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night is all over town, in various forms, this morning. It will be all over everywhere in a few days. I had the news service kill it, temporarily, but that was mere spitting in the wind. It's too late for a coverup, even if I wanted to do one. So what shall I betray this day? A friend? Or Ezar Vorbarra's trust? There is no doubt which decision *he* would have made."

He sat back beside her, and took her in his arms. "And this is only the beginning. Every month, every week, there will be some other impossible thing. What's going to be left of me after fifteen years of this? A husk, like that thing we buried three months ago, praying with his last breath that there may be no God? Or a power-corrupted monstrosity, like his son, so infected it could only be sterilized by plasma arc? Or something even worse?"

His naked agony terrified her. She held him tightly in return. "I don't know. I don't know. But somebody . . . somebody has been making these kinds of decisions right along, while we went around blissfully unconscious, taking the world as given. And they were only human, too. No better, no worse than you."

"Frightening thought."

She sighed. "You can't choose between evil and evil, in the dark, by logic. You can only cling to some safety line of principle. I can't make your decision. But whatever principles you choose now are going to be your safety lines, to carry you forward. And for the sake of your people, they're going to have to be consistent ones."

He rested in her arms. "I know. There wasn't really a question about the decision. I was just . . . kicking a bit, going down." He disengaged himself, and stood again. "Dear Captain. If I'm still sane, fifteen years from now, I believe it will be your doing."

She looked up at him. "So what decision is it?"

The pain in his eyes gave her the answer. "Oh, no," she said involuntarily, then bit off further words. And I was trying to speak so wisely. I didn't mean *this*.

"Don't you know?" he said gently, resigned. "Ezar's way is the only way that can work, here. It's true after all. He does rule from his grave." He headed for their bathroom, to wash and change his clothes.

"But you're not him," she whispered to the empty room. "Can't you find a way of your own?"

CHAPTER EIGHT

Vorkosigan attended Carl Vorhalas's public execution three weeks later.

"Are you required to go?" Cordelia asked him that morning, as he dressed, cold and withdrawn. "I don't have to go, do I?"

"God, no, of course not. I don't have to go, officially, except . . . I have to go. You can see why, surely."

"Not . . . really, except as a form of self-punishment. I'm not sure that's a luxury you can afford, in your line of work."

"I must go. A dog returns to its vomit, doesn't it? His parents will be there, do you know? And his brother."

"What a barbaric custom."

"Well, we could treat crime as a disease, like you Betans. You know what that's like. At least we kill a man

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cleanly, all at once, instead of in bits over years. . . . I don't know."

"How will they . . . do it?"

"Beheading. It's supposed to be almost painless."

"How do they know?"

His laugh was totally without humor. "A very cogent question."

He did not embrace her when he left. He returned a bare two hours later, silent, to shake his head at a tentative offer of lunch, cancel an afternoon appointment, and withdraw to Count Piotr's library and sit, not reading a bookviewer. Cordelia joined him there after a while, resting on the couch, and waited patiently for him to come back to her from whatever distant country of the mind he dwelt in.

"The boy was going to be brave," he said after an hour's silence. "You could see that he had every gesture planned out in advance. But nobody else followed the script. His mother broke him down. . . . And to top it, the damned executioner missed his stroke. Had to take three cuts, to get the head off."

"Sounds like Sergeant Bothari did better with a pocket knife." Vorrutyer had been haunting her more than usual that morning, scarletly.

"It lacked nothing for perfect hideousness. His mother cursed me, too. Until Evon and Count Vorhalas took her away." The dead-expressioned voice escaped him then. "Oh, Cordelia! It can't have been the right decision! And yet . . . and yet . . . no other one was possible. Was it?"

He came to her then, and held her in silence. He seemed very close to weeping, and it almost frightened her more that he did not. The tension eventually drained out of him.

"I suppose I'd better pull myself together and go change. Vortala has a meeting scheduled with the minister of agriculture that's too important to miss, and after that there's the general staff. . . ." By the time he left his usual self-possession had returned.

That night he lay long awake beside her. His eyes were closed, but she could tell from his breathing it was pretense. She could not dredge up one word of comfort that did not seem inane to her, so kept silence with him through the watches of the night. Rain began outside, a steady drizzle. He spoke once.

"I've watched men die before. Ordered executions, ordered men into battle, chosen this one over that one, committed three sheer murders and but for the grace of God and Sergeant Bothari would have committed a fourth. . . . I don't know why this one should hit like a wall. It's stopped me, Cordelia. And I dare not stop, or we'll all fall together. Got to keep it in the air somehow."

She awoke in the dark to a tinkling crash and a soft report, and drew in her breath with a start. Acridity seared her lungs, mouth, nostrils, eyes. A gut-wrenching undertaste pumped her stomach into her throat. Beside her, Vorkosigan snapped from sleep with an oath.

"Soltoxin gas grenade! Don't breathe, Cordelia!" Emphasizing his shout, he shoved a pillow over her face, his hot strong arms encircling her and dragging her from the bed. She found her feet and lost her stomach at the same moment, stumbling into the hall, and he slammed the bedroom door shut behind

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them.

Running footsteps shook the floor. Vorkosigan cried, "Get back! Soltoxin gas! Clear the floor! Call Illyan!" before he doubled over, coughing and retching. Other hands bundled them toward the stairs. She could scarcely see through her madly watering eyes.

Between spasms Vorkosigan gasped, "They'll have the antidote . . . Imperial Residence . . . closer than ImpMil . . . get Illyan at once. He'll know. Into the shower—where's milady's woman? Get a maid. . . ."

Within moments she was dumped into a downstairs shower, Vorkosigan with her. He was shaking and barely able to stand, but still trying to help her. "Start washing it off your skin, and keep washing. Don't stop. Keep the water cool."

"You, too, then. What was that crap?" She coughed again, in the spray of the water, and they exchanged help with the soap.

"Wash out your mouth, too . . . Soltoxin. It's been fifteen, sixteen years since I last smelled that stink, but you never forget it. It's a poison gas. Military. Should be strictly controlled. How the hell anyone got hold of some . . . damn Security! They'll be flapping around like headless chickens tomorrow . . . too late." His face was greenish-white beneath the night's beard stubble.

"I don't feel too bad now," said Cordelia. "Nausea's passing off. I take it we missed the full dose?"

"No. It just acts slowly. Doesn't take much at all to do you. It mostly affects soft tissue—lungs will be jelly in an hour, if the antidote doesn't get here soon."

The growing fear that pounded in her gut, heart, and mind half-clotted her words. "Does it cross the placental barrier?"

He was silent for too long before he said, "I'm not sure. Have to ask the doctor. I've only seen the effects on young men." Another spasm of deep coughing seized him, that went on and on.

One of Count Piotr's serving women arrived, disheveled and frightened, to help Cordelia and the terrified young guard who had been assisting them. Another guard came in to report, raising his voice over the running water. "We reached the Residence, sir. They have some people on the way."

Cordelia's own throat, bronchia, and lungs were beginning to secrete foul-tasting phlegm, and she coughed. "Anyone see Drou?"

"I think she took out after the assassins, milady."

"Not her job. When an alarm goes up she's supposed to run to Cordelia," growled Vorkosigan. The talking triggered more coughing.

"She was downstairs, sir, at the time the attack took place, with Lieutenant Koudelka. They both went out the back door."

"Dammit," Vorkosigan muttered, "not his job either." His effort was punished by another coughing jag. "They catch anybody?"

"I think so, sir. There was some kind of uproar at the back of the garden, by the wall."

They stood under the water for a few more minutes, until the guard reported back, "The doctor from the Residence

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is here, sir."

The maid wrapped Cordelia in a robe, and Vorkosigan put on a towel, growling to the guard, "Go find me some clothes, boy." His voice rattled like gravel.

A middle-aged man, his hair standing up stiffly, wearing trousers, pajama top, and bedroom slippers, was off-loading equipment in the guest bedroom when they came out. He took a pressurized canister from his bag and fitted a breathing mask to it, glancing at Cordelia's rounding abdomen and then at Vorkosigan.

"My lord. Are you certain of the identification of the poison?"

"Unfortunately, yes. It was soltoxin."

The doctor bowed his head. "I am sorry, milday."

"Is it going to hurt my . . ." she choked on the mucus.

"Just shut up and give it to her," snarled Vorkosigan.

The doctor fitted the mask over her nose and mouth. "Breathe deeply. Inhale . . . exhale. Keep exhaling. Now draw in. Hold it. . . ."

The antidote gas had a greenish taste, cooler, but nearly as nauseating as the original poison. Her stomach heaved, but had nothing left in it to reject. She watched Vorkosigan over the mask, watching her, and tried to smile reassuringly. It must be reaction catching up with him; he seemed greyer, more distressed, with each breath she took. She was certain he had taken in a larger dose than she, and pushed the mask away to say, "Isn't it about your turn?"

The doctor pressed it back, saying, "One more breath, milady, to be sure." She inhaled deeply, and the doctor transferred the mask to Vorkosigan. He seemed to need no instruction in the procedure.

"How many minutes since the exposure?" asked the doctor anxiously.

"I'm not sure. Did anyone note the time? You, uh . . ." she had forgotten the young guard's name.

"About fifteen or twenty minutes, milady, I think."

The doctor relaxed measurably. "It should be all right, then. You'll both be in hospital for a few days. I'll arrange for medical transport. Was anyone else exposed?" he asked the guard.

"Doctor, wait." He had repossessed canister and mask, and was making for the door. "What will that . . . soltoxin do to my baby?"

He did not meet her eyes. "No one knows. No one has ever survived exposure without an immediate antidote treatment."

Cordelia could feel her heart beating. "But given the treatment . . . ." She did not like his look of pity, and turned to Vorkosigan. "Is that—" but was stopped cold by his expression, a leaden greyness lit from beneath by pain and growing anger, a stranger's face with a lover's eyes, meeting her eyes at last.

"Tell her about it," he whispered to the doctor. "I can't."

"Need we distress—"

"*Now*. Get it over with." His voice cracked and croaked.

"The problem is the antidote, milady," said the doctor reluctantly. "It's a violent teratogen. Destroys bone development in the growing fetus. Your bones are grown, so it won't affect you, except for an increased tendency to ar-

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thritic-type breakdowns, which can be treated . . . if and when they arise . . .'' he trailed off as she closed her eyes, shutting him out.

''I must see that hall guard,'' he added.

''Go, go,'' replied Vorkosigan, releasing him. He maneuvered out the door past the guard arriving with Vorkosigan's clothes.

She opened her eyes to Vorkosigan, and they stared at each other.

''The look on your face . . .'' he whispered. ''It's not . . . Weep. Rage! Do something!'' His voice rose hoarsely. ''Hate me at least!''

''I can't,'' she whispered back, ''feel anything yet. Tomorrow, maybe.'' Every breath was fire.

With a muttered curse, he flung on the clothes, a set of undress greens. ''I can do something.''

It was the stranger's face, possessing his. Words echoed hollowly in her memory, *If Death wore a dress uniform he would look just like that.*

''Where are you going?''

''Going to see what Koudelka caught.'' She followed him through the door. ''You stay here,'' he ordered.

''No.''

He glared back at her, and she brushed the glare away with an equally savage gesture, as if striking down a sword thrust. ''I'm going with you.''

''Come on, then.'' He turned jerkily, and made for the stairs to the first floor, rage rigid in his backbone.

''You will not,'' she murmured fiercely, for his ear alone, ''murder anyone in front of me.''

''Will I not?'' he whispered back. ''Will-I-not?'' His steps were hard, bare feet jarring on the stone stairs.

The large entry hall was in chaos, filled with their guards, men in the Count's livery, medics. A man, or a body, Cordelia could not tell which, in the black fatigue uniform of the night guards, was laid out on the tesselated pavement, a medic at his head. Both were soaked from the rain, and smeared with mud. Bloodstained water pooled beneath them, and the medic's boot soles squeaked in it.

Commander Illyan, beads of water gleaming in his hair from the foggy drizzle, was just coming in the front door with an aide, saying, ''Let me know as soon as the techs get here with the kirilian detector. Meantime keep everyone off that wall and out of the alley. My lord!'' he cried when he saw Vorkosigan. ''Thank God you're all right!''

Vorkosigan growled in his throat, wordlessly. A knot of men surrounded the prisoner, who was leaning face to the wall, one hand over his head and the other held stiffly to his side at an odd angle. Droushnakovi stood near, wearing a wet shift. A wicked-looking metal crossbow dangled gleaming from her hand, evidently the weapon that had been used to fire the gas grenade through their window. She bore a livid mark on her face, and staunched a nosebleed with her other hand. Blood stained her nightgown here and there. Koudelka was there too, leaning on his sword, one leg dragging. He wore a wet and muddy uniform and bedroom slippers, and a sour look on his face.

''I'd have had him,'' he was snapping, evidently continuing an ongoing argument, ''if you hadn't come running up and shouting at me—''

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"Oh, really!" Droushnakovi snapped back. "Well, pardon me, but I don't see it that way. Seems to me he had you, laid out flat on the ground. If I hadn't seen his legs going up the wall—"

"Stuff it! It's Lord Vorkosigan!" hissed another guard. The knot of men turned, to step back before his face.

"How did he get in?" began Vorkosigan, and stopped. The man was wearing the black fatigues of the Service. "Surely not one of your men, Illyan!" His voice grated, metal on stone.

"My lord, we've got to have him alive, to question him," said Illyan uneasily at Vorkosigan's shoulder, half-hypnotized by the same look that had made the guards recoil. "There may be more to the conspiracy. You can't—"

The prisoner turned, then, to face his captors. A guard started forward to shove him back into position against the wall, but Vorkosigan motioned him away. Cordelia could not see Vorkosigan's face, standing behind him in that moment, but his shoulders lost their murderous tension, and the rage drained out of his backbone, leaving only a gutter-smear of pain. Above the insignialess black collar was the ravaged face of Evon Vorhalas.

"Oh, not both of them," breathed Cordelia.

Hatred hastened the rhythm of Vorhalas's breathing as he glared at his intended victim. "You bastard. You snake-cold bastard. Sitting there cold as stone while they hacked off his head. Did you feel a thing? Or did you enjoy it, my Lord Regent? I swore I'd get you then."

There was a long silence, then Vorkosigan leaned close to him, one arm extended past his head for support against the wall. He whispered hoarsely, "You missed me, Evon."

Vorhalas spat in his face, spittle bloody from his injured mouth. Vorkosigan made no move to wipe it away. "You missed my wife," he went on in a slow soft cadence. "But you got my son. Did you dream of sweet revenge? You have it. Look at her eyes, Evon. A man could drown in those sea-grey eyes. I'll be looking at them every day for the rest of my life. So eat vengeance; Evon. Drink it. Fondle it. Wrap it round you in the night watch. It's all yours. I will it all to you. For myself, I've gorged it to the gagging point, and have lost my stomach for it."

Vorhalas looked up, then, for the first time, past him to Cordelia. She thought of the child in her belly, his delicate girdering of new cartiliginous bones perhaps even now beginning to rot, twist, slough, but could not hate Vorhalas, although she tried to for a moment. She couldn't even find him baffling. She had a sense, as of a second sight, that she could see right through his wounded spirit the way doctors saw through a wounded body with their diagnostic viewers. Every twist and tear and emotional abrasion, every young cancer of resentment growing from them, and above all the great gash of his brother's death seemed red-lined in her mind's eye.

"He didn't enjoy it, Evon," she said. "What would you have had from him? Do you even know?"

"A little human pity," he snarled. "He could have saved Carl. Even then he could have. I thought at first that was

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why he had come."

"Oh, God," said Vorkosigan. He looked sick at the flashing vision of the rise and fall of hopes these words conjured. "I don't play theater with lives, Evon!"

Vorhalas held his hatred like a shield before him. "Go to hell."

Vorkosigan sighed, and pushed away from the wall. The doctor was lingering to chivvy them to the waiting vehicle for the trip to the Imperial Military Hospital. "Take him away, Illyan," said Vorkosigan wearily. .

"Wait," said Cordelia. "I need to know—I need to ask him something."

Vorhalas eyed her sullenly.

"Was this the result you intended? I mean, when you chose that particular weapon? That specific poison?"

He looked away from her, speaking to the far wall. "It was what I could grab, going through the armory. I didn't think you could identify it, and get the antidote all the way from ImpMil in time. . . ."

"You relieve me of a burden," she whispered.

"The antidote came from the Imperial Residence," Vorkosigan explained. "A quarter of the distance. The emperor's infirmary there has everything. As for identification . . . I was there, at the destruction of the Karian mutiny. Just about your age, I think, or a little younger. The smell brought it all back, just now. Boys coughing out their lungs in red blobs. . . ." He seemed to shrink into himself, into the past.

"I didn't intend your death particularly. You were just in the way, between me and him." Vorhalas gestured blindly at her swollen torso. "It wasn't the result I intended. I meant to kill him. I didn't even know for sure that you shared the same room at night." He was looking everywhere, now, except her face. "I never thought about killing your . . ."

"Look at me," she croaked, "and say the word out loud."

"Baby," he whispered, and burst into sudden, shocking sobs.

Vorkosigan stepped back, beside her. "Wish you hadn't done that," he whispered. "Reminds me of his brother. Why am I death to that family?"

"Still want him to eat vengeance?"

He leaned his forehead on her shoulder, briefly. "Not even that. You empty us all out, dear Captain. But, oh . . ." His hand reached out as if to cup her belly, then drew back in consciousness of their ring of silent watchers. He straightened. "Bring me a full report in the morning, Illyan," he said, "at the hospital."

He took her by the arm as they turned to follow the doctor. She could not tell if it was to support her or himself.

She was surrounded by helpers at the Imperial Military Hospital complex, carried along as on a river. Doctors, nurses, corpsmen, guards. Aral was separated from her at the door, and it made her uneasy and alone in the crowd. She said very little to them, empty courtesies, automatic as levers. She wished for shock to take her consciousness, numbness, reality-denying madness, hallucinations, anything. Instead she just felt tired.

The baby was moving inside her, flutters, kneeing turns; evidently the teratogenic antidote was a very slow-act-

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ing poison. They were still granted a little time together, it seemed, and she loved him through her skin, her fingertips moving in a slow massage over her abdomen. *Welcome, my son, to Barrayar, the abode of cannibals; this place didn't even wait the usual eighteen or twenty years to eat you. Ravenous country.*

She was bedded down in a luxurious private room in a VIP wing, hastily cleared for their exclusive use. She was relieved to discover Vorkosigan had been ensconced just across the hall. Dressed already in green military issue pajamas, he came promptly over to see her tucked into bed. She managed a small smile for him, but did not attempt to sit up. The force of gravity was pulling her down into the center of the world. Only the rigidity of the bed, the building, the planet's crust, held her up against it, not her will at all.

He was trailed by an anxious corpsman, saying, "Remember, sir, try not to talk so much, till after the doctor's had a chance to give your throat the irrigation treatment."

The grey light of dawn was making the windows pale. He sat on the edge of the bed and took her hand, rubbing it. "You're cold, dear Captain," he whispered hoarsely. She nodded. Her chest ached, her throat was raw, and her sinuses burned.

"I should never have let them talk me into taking the job," he went on. "So sorry. . . ."

"I talked you into it too. You tried to warn me. Not your fault. It seemed right for you. Is right."

He shook his head. "Don't talk. Makes scar tissue on the vocal cords."

She gave vent to a joyless "Ha!" and laid a finger across his lips as he started to speak again. He nodded, resigned, and they remained looking at each other for a time. He pushed her tangled hair back gently from her face, and she captured the broad hand to hold against her cheek for comfort, until he was hunted out by a posse of doctors and technicians and driven off for a treatment. "We'll be in to see you shortly, milady," their chieftan promised ominously.

They returned after a while, to make her gargle a nasty pink fluid, and breathe into a machine, then rumbled out again. A female nurse brought her breakfast, which she did not touch.

Then a committee of grim-faced doctors entered her room. The one who had come from the Imperial Residence in the night was now smartly groomed and neatly dressed in civilian clothes. Her own personal physician was flanked by a younger, black-browed man in Service greens with captain's tabs on his collar. She gazed at their three faces and thought of Cerberus.

Her man introduced the stranger. "This is Captain Vaagen, of the Imperial Military Hospital's research facility. He's our resident expert on military poisons."

"Inventing them, or cleaning up after them, Captain?" Cordelia asked.

"Both, milady." He stood at a sort of aggressive parade rest.

Her own man had the look about his eyes of someone who had drawn the short straw, although his lips smiled. "My lord regent has asked me to inform you of the schedule of treatments, and so on. I'm afraid," he cleared his

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throat, "that it would be best if we scheduled the abortion promptly. It is already unusually late in your pregnancy for it, and it would be as well for your recovery to relieve you of the physiological strain as soon as possible."

"Is there nothing that can be done?" she asked hopelessly, already knowing the answer from their faces.

"I'm afraid not," said her man sadly. The man from the Imperial Residence nodded confirmation.

"I ran a literature search," said the captain unexpectedly, staring out a window, "and there was that calcium experiment. True, the results they got weren't particularly heartening—"

"I thought we'd agreed not to bring that up," glared the Residence man.

"Vaagen, that's cruel," said her own man. "You're just raising false hopes. You can't make the Regent's wife into one of your hapless experimental animals for a lot of untried shots in the dark. You have your permission from the Regent for the autopsy—leave it at that."

Her world turned right-side-up again in a second, as she looked at the face of the man with ideas. She knew the type; half-right, half-cocked, half-successful, flitting from one monomania to another like a bee pollinating flowers, gathering little fruit but leaving seeds behind. She was nothing to him, personally, but the raw material for a monograph. The risks she took did not appall his imagination, she was not a person but a disease state. She smiled upon him, slowly, wildly, knowing him then for her ally in the enemy camp.

"How do you do, Dr. Vaagen? How would you like to write the paper of a lifetime?"

The Residence man barked a laugh. "She's got your number, Vaagen."

He smiled back, astonished to be so instantly understood. "You realize, I can't guarantee any results—"

"Results!" interrupted her man. "My God, you'd better let her know what your idea of results is. Or show her the pictures—no, don't do that. Milady," he turned to her, "the treatment he's discussing was last tried twenty years ago. It did irreparable damage to the mothers. And the results—the very best results you could hope for would be a twisted cripple. Perhaps much worse. Indescribably worse."

"Jellyfish describes it pretty well," said Vaagen.

"You're inhuman, Vaagen!" snapped her man, with a glance her way to check the distress quotient.

"A viable jellyfish, Dr. Vaagen?" asked Cordelia, intent.

"Mm. Maybe," he replied, inhibited by his colleagues' angry glares. "But there is the difficulty of what happens to the mothers when the treatment is applied in vivo."

"So, can't you do it in vitro?" Cordelia asked the obvious question.

Vaagen shot a glance of triumph at her man. "It would certainly open up a number of possible lines of experiment, if it could be arranged," he murmured to the ceiling.

"In vitro?" said the Residence man, puzzled. "How?"

"What, how?" said Cordelia. "You've got seventeen Escobaran-manufactured uterine replicators stored in a closet around here somewhere, car-

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ried home from the war." She turned excitedly to Vaagen. "Do you happen to know a Dr. Henri?"

Vaagen nodded. "We've worked together."

"Then you know all about them!"

"Well—not exactly all. But, ah—in fact, he informs me that they are available. But you understand, I'm not an obstetrician."

"You certainly aren't," said her man. "Milady, this man isn't even a physician. He's only a biochemist."

"But you're an obstetrician," she pointed out. "So we have the whole team, then. Dr. Henri, and, um, Captain Vaagen here for Piotr Miles, and you, for the transfer."

His lips were compressed, and his eyes held a very strange expression. It took her a moment to identify it as fear. "I can't do the transfer, milady," he said. "I don't know how. Nobody on Barrayar has ever done one."

"You don't advise it, then?"

"Definitely not. The possibility of permanent damage—you can, after all, begin again in a few months, if the soft-tissue scarring doesn't extend to testicular—ahem. You can begin again. I am your doctor, and that is my considered opinion."

"Yes, if somebody else doesn't knock Aral off in the meantime. I must remember this is Barrayar, where they are so in love with death they bury men who are still twitching. *Are* you willing to try the operation?"

He drew himself up in dignity. "No, milady. And that's final."

"Very well." She pointed a finger at her doctor, "You're out," and shifted it to Vaagen, "you're in. You are now in charge of this case. I rely on you to find me a surgeon—or a medical student, or a horse doctor, or *somebody* who's willing to try. And then you can experiment to your heart's content."

Vaagen looked mildly triumphant; her former man looked furious. "We had better see what my lord regent has to say, before you carry his wife off on this wave of criminally false optimism."

Vaagen looked a little less triumphant.

"You thinking of charging over there right now?" asked Cordelia.

"I'm sorry, milady," said the Residence man, "but I think we'd do best to quash this thing right now. You don't know Captain Vaagen's reputation. Sorry to be so blunt, Vaagen, but you're an empire builder, and this time you've gone too far."

"Are you ambitious for a research wing, Captain Vaagen?" Cordelia inquired.

He shrugged, embarrassed rather than outraged, so she knew the Residence man's words to be at least half true. She gathered Vaagen in by eye, willing to possess him body, mind, and soul, but especially mind, and wondering how best to fire his imagination in her service.

"You shall have an institute, if you can bring this off. You tell him," she jerked her head in the direction of the hall, toward Aral's room, "*I* said so."

Variously discomfited, angry, and hopeful, they withdrew. Cordelia lay back on the bed and whistled a little soundless tune, her fingertips continuing their slow abdominal massage.

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Gravity had ceased to exist.

CHAPTER NINE

She slept at last, toward the middle of the day, and woke disoriented. She squinted at the afternoon light slanting through the hospital room's windows. The grey rain had gone away. She touched her belly, for grief and reassurance, and rolled over to find Count Piotr sitting at her bedside.

He was dressed in his country clothes, old uniform trousers, plain shirt, a jacket that he wore only at Vorkosigan Surleau. He must have come up directly to ImpMil. His thin lips smiled anxiously at her. His eyes looked tired and worried.

"Dear girl. You need not wake up for me."

"That's all right." She blinked away blear from her eyes, feeling older than the old man. "Is there something to drink?"

He hastily poured her cold water from the bedside basin spigot, and watched her swallow. "More?"

"That's enough. Have you seen Aral yet?"

He patted her hand. "I've talked to Aral already. He's resting now. I am so sorry, Cordelia."

"It may not be as bad as we feared at first. There's still a chance. A hope. Did Aral tell you about the uterine replicator?"

"Something. But the damage has already been done, surely. Irrevocable damage."

"Damage, yes. How irrevocable it is, no one knows. Not even Captain Vaagen."

"Yes, I met Vaagen a little while ago." Piotr frowned. "A pushing sort of fellow. New Man type."

"Barrayar needs its new men. And women. Its technologically-trained generation."

"Oh, yes. We fought and slaved to create them. They are absolutely necessary. They know it, too, some of them." A hint of self-aware irony softened his mouth. "But this operation you're proposing, this placental transfer . . . it doesn't sound too safe."

"On Beta Colony, it would be routine," Cordelia shrugged. *We are not, of course, on Beta Colony.*

"But something more straightforward, better understood—you would be ready to begin again much sooner. In the long run, you might actually lose less time."

"Time . . . isn't what I'm worried about losing." A meaningless concept, now that she thought of it. She lost 26.7 hours every Barrayaran day. "Anyway, I'm never going through *that* again. I'm not a slow learner, sir."

A flicker of alarm crossed his face. "You'll change your mind, when you feel better. What does matter now—I've talked to Captain Vaagen. There seemed no question in his mind there is great damage."

"Well, yes. The unknown is whether there can be great repairs."

"Dear girl." His worried smile grew tenser. "Just so. If only the fetus were a girl . . . or even a second son . . . we could afford to indulge your understandable, even laudable, maternal emotions. But this thing, if it lived, would be *Count Vorkosigan* someday. We cannot afford to have a deformed *Count Vorkosigan*." He sat back, as if

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he had just made some cogent point.

Cordelia wrinkled her brow. "Who is we?"

"House Vorkosigan. We are one of the oldest great houses on Barrayar. Never, perhaps, the richest, seldom the strongest, but what we've lacked in wealth we've made up in honor. Nine generations of Vor warriors. This would be a horrible end to come to, after nine generations, don't you see?"

"House Vorkosigan, at this point in time, consists of two individuals, you and Aral," Cordelia observed, both amused and disturbed. "And Counts Vorkosigan have come to horrible ends throughout your history. You've been blown up, shot, starved, drowned, burned alive, beheaded, diseased, and demented. The only thing you've never done is die in bed. I thought horrors were your stock in trade."

He returned her a pained smile. "But we've never been *mutants*."

"I think you need to talk to Vaagen again. The fetal damage he described was teratogenic, not genetic, if I understand him correctly."

"But people will *think* it's a mutant."

"What the devil do you care what some ignorant prole thinks?"

"Other Vor, dear."

"Vor, prole, they're equally ignorant, I assure you."

His hands twitched. He opened his mouth, closed it again, frowned, and said more sharply, "A Count Vorkosigan has never been an experimental laboratory animal, either."

"There you go, then. He serves Barrayar even before he's born. Not a bad start on a life of honor." Perhaps some good would come of it, in the end, some knowledge gained; if not help for themselves, then for some other parents' grief. The more she thought about it, the more right her decision felt, on more than one level.

Piotr jerked his head back. "For all you Betans seem soft, you have an appalling cold-blooded streak in you."

"Rational streaks, sir. Rationality has its merits. You Barrayarans ought to try it sometime." She bit her tongue. "But we run ahead of ourselves, I think, sir. There are lots of d—" *dangers*, "difficulties yet to come. A placental transfer this late in pregnancy is tricky even for galactics. I admit, I wish there were time to import a more experienced surgeon. But there's not."

"Yes . . . yes . . . it may yet die, you're right. No need to . . . but I'm afraid for you, too, girl. Is it worth it?"

Was what worth what? How could she know? Her lungs burned. She smiled wearily at him, and shook her head, which ached with tight pressure in her temples and neck.

"Father," came a raspy voice from the doorway. Aral leaned there, in his green pajamas, a portable oxygenator stuck up his nose. How long had he stood there? "I think Cordelia needs to rest."

Their eyes met, over Piotr. *Bless you, love. . . .*

"Yes, of course." Count Piotr gathered himself together, and creaked to his feet. "I'm sorry, you're quite correct." He pressed Cordelia's hand one more time, firmly, with his dry old-man's grip. "Sleep. You'll be able to think more clearly later."

"Father."

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"You shouldn't be out of bed, should you?" said Piotr, drawn off. "Go back and lie down, boy. . . ." his voice drifted away, across the corridor.

Aral returned later, after Count Piotr had finally left.

"Was Father bothering you?" he asked, looking grim. She held out her hand to him, and he sat beside her. She transferred her head from her pillow to his lap, her cheek on the firm-muscled leg beneath the thin pajama, and he stroked her hair.

"No more than usual," she sighed.

"I feared he was upsetting you."

"It's not that I'm not upset. It's just that I'm too tired to run up and down the corridor screaming."

"Ah. He did upset you."

"Yes." She hesitated. "In a way, he has a point. I was so afraid for so long, waiting for the blow to fall, from somewhere, nowhere, anywhere. Then came last night, and the worst was done, over . . . except it's not over. If the blow had been more complete, I could stop, quit now. But this is going to go on and on." She rubbed her cheek against the cloth. "Did Illyan come up with anything new? I thought I heard his voice out there, earlier."

His hand continued to stroke her hair, in even rhythm. "He'd finished the preliminary fast-penta interrogation of Evon Vorhalas. He's now investigating the old armory where Evon stole the soltoxin. It appears Evon might not have equipped himself so ad hoc unilaterally as he claimed. An ordnance major in charge there has disappeared, AWOL. Illyan's not certain yet if the man was eliminated, to clear Evon's path, or if he actually helped Evon, and has gone into hiding."

"He might just be afraid. If it was dereliction."

"He'd better be afraid. If he had any conscious connivance in this . . ." his hand clenched in her hair, he became aware of the pull, muttered "Sorry," and continued petting. Cordelia, feeling very much like an injured animal, crept deeper into his lap, her hand on his knee.

"About Father—if he upsets you again, send him to me. You shouldn't have to deal with him. I told him it was your decision."

"My decision?" Her hand rested, without moving. "Not our decision?"

He hesitated. "Whatever you want, I'll support you."

"But what do you want? Something you're not telling me?"

"I can't help understanding his fears. But . . . there's something I haven't discussed with him yet, nor am I going to. The next child may not be so easy to come by as the first."

Easy? You call this easy?

He went on, "One of the lesser-known side effects of soltoxin poisoning is testicular scarring, on the micro-level. It could reduce fertility below the point of no return. Or so my examining physician warns me."

"Nonsense," said Cordelia. "All you need is any two somatic cells and a replicator. Your little finger and my big toe, if that's all they can scrape off the walls after the next bomb, could go on reproducing little Vorkosigans into the next century. However many our survivors choose to afford."

"But not naturally. Not without leaving Barrayar."

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"Or changing Barrayar. *Dammit.*" His hand jerked back at the bite in her tone. "If only I had *insisted* on using the replicator in the first place, the baby need never have been at risk. I knew it was safer, I knew it was there—" her voice broke.

"Sh. Sh. If only I had . . . not taken the job. Kept you at Vorkosigan Surleau. Pardoned that murderous idiot Carl, for God's sake. If only we'd slept in separate rooms—"

"No!" Her hand tightened on his knee. "And I refuse to go live in some bomb shelter for the next fifteen years. Aral, this place has to change. This is unbearable." *If only I had never come here.*

If only. If only. If only.

The operating room seemed clean and bright, if not so copiously equipped as galactic standard. Cordelia, wafting on her float pallet, turned her head sideways to take in as much detail as she could. Lights, monitors, an operating table with a catch-basin set beneath it, a tech checking a bubbling tank of clear yellow fluid. This was not, she told herself sternly, the point of no return. This was simply the next logical step.

Captain Vaagen and Dr. Henri stood sterile-garbed and waiting, beyond the operating table. Next to them sat the portable uterine replicator, a metal and plastic container half a meter tall, studded with control panels and access ports. The lights on its sides glowed green and amber. Cleaned, sterilized, its nutrient and oxygen tanks recharged and ready . . . Cordelia eyed it with profound relief. The primitive Barrayaran back-to-the-apes style gestation was nothing but the utter failure of reason to triumph over emotion. She'd so wanted to please, to fit in, to try to become Barrayaran. . . . *And so my child pays the price. Never again.*

Dr. Ritter, the surgeon, was tall and dark-haired, with olive skin and long lean hands. Cordelia had liked his hands the first moment she saw them. Steady. Ritter and a medtech now positioned her over the operating table, and shifted the float pallet out from under her. Dr. Ritter smiled reassuringly. "You're doing fine."

Of course I'm fine, we haven't even started yet, Cordelia thought irritably. Dr. Ritter was palpably nervous, though the tension somehow stopped at his elbows. The surgeon was a friend of Vaagen's, whom Vaagen had strong-armed into this, after they'd spent a day running through a list of more experienced men who refused to touch the case.

Vaagen had explained it to Cordelia. "What do you call four big bravos with clubs in a dark alley?"

"What?"

"A Vor lord's malpractice suit." He'd chuckled. Vaagen's sense of humor was acid-black. Cordelia could have hugged him for it. He'd been the only person to crack a joke in her presence in the last three days, possibly the most rational and honest person she'd met since she'd left Beta Colony. She was glad he was here.

They rolled her to her side, and touched her spine with the medical stun. A tingle, and her cold feet felt suddenly warm. Her legs went abruptly inert, like bags of lard.

"Can you feel that?" asked Dr.

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Ritter.

"Feel what?"

"Good." He nodded to the tech, and they straightened her out. The tech uncovered her stomach, and turned on the sterilizer-field. The surgeon palpated her, cross-checking the holovid monitors for the infant's exact position within her.

"Are you sure you wouldn't rather be asleep through this?" Dr. Ritter asked her for the last time.

"No. I want to watch. This is my first child being born." *Maybe my only child being born.*

He smiled wanly. "Brave girl."

Girl, hell, I'm older than you. Dr. Ritter, she sensed, would rather not be watched. Tough.

Dr. Ritter paused, taking one last glance around as if mentally checklisting the readiness of his tools and people. And will and nerve, Cordelia guessed.

"Come on, Ritter my man, let's get this over with," said Vaagen, tapping his fingers impatiently. His tone was a peculiar mix, a little sarcastic prodding lilt over an underlying warmth of genuine encouragement. "My scans show bone sloughing already underway. If the disintegration gets too far advanced, I'll have no matrix left to build from. Cut now, chew your nails later."

"Chew your own nails, Vaagen," said the surgeon genially. "Jog my elbow again and I'll have my tech put a speculum down your throat."

Very old friends, Cordelia gauged. But the surgeon raised his hands, took a breath and a grip on his vibra-scalpel, and sliced her belly open in one perfectly-controlled stroke. The medtech followed his motion smoothly with the surgical hand-tractor, clamping blood vessels; scarcely a cat-scratch of blood escaped. Cordelia felt pressure but no pain. Other cuts laid open her uterus.

A placental transfer was vastly more demanding than a straightforward cesarean section. The fragile placenta must be chemically and hormonally persuaded to release from the blood-vessel-enriched uterus, without damaging too many of its multitude of tiny villi, then floated free from the uterine wall in a running bath of highly oxygenated nutrient solution. The replicator sponge then had to be slipped into place between the placenta and the uterine wall, and the placenta's villi at least partially induced to reinterdigitate on its new matrix, before the whole mess could be lifted from the living body of the mother and placed in the replicator. The more advanced the pregnancy, the more difficult the transfer.

The umbilical cord between placenta and infant was monitored, and extra oxygen injected by hypospray as needed. On Beta Colony, a nifty little device would do this; here, an anxious tech hovered.

The tech began running the clear bright yellow solution-bath into her uterus. It filled her, and ran over, trickling pink-tinged down her sides and into the catch basin. The surgeon was now working, in effect, under water. No question about it, a placental transfer was a messy operation.

"Sponge," called the surgeon softly, and Vaagen and Henri trundled the uterine replicator to her side, and strung out the matrix sponge from it on its feed lines. The surgeon fiddled interminably

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with a tiny hand-tractor, his hands out of Cordelia's line of sight as she peered down cross-eyed over her chest to her rounded—so-barely-rounded—belly. She shivered. Ritter was sweating.

"Doctor . . ." a tech pointed to something on a vid monitor.

"Mm," said Ritter, glancing up, then continuing fiddling. The techs murmured, Vaagen and Henri murmured, calm, professional, reassuring. . . . she was so *cold*. . . .

The fluid trickling over the white dam of her skin changed abruptly from pink-tinged to bright, bright red, a splashing flow, much faster than the input feed was emitting.

"*Clamp* that," hissed the surgeon.

Cordelia caught just a glimpse, beneath a membrane, of tiny arms, legs, a wet dark head, wriggling on the surgeon's gloved hands, no larger than a half-drowned kitten. "Vaagen! Take this thing of yours *now* if you want it!" snapped Ritter. Vaagen plunged his gloved hands into her belly as dark whorls clouded Cordelia's vision, her head aching, exploding in sudden sparkling flashes. The blackness ballooned out, overwhelming her. The last thing she heard was the surgeon's despairing sibilant voice, "Oh, *shit*. . . !"

Her dreams were foggy with pain. The worst part was the choking. She choked and choked, and wept for lack of air. Her throat was full of obstructions, and she clawed at it, until her hands were bound. She dreamed of Vorrutyer's tortures, then, multiplied and extended into insane complications that went on for hours. A demented Bothari knelt on her chest, and she could get no air at all.

When she finally woke clear-headed, it was like breaking up out of some underground prison-hell into God's own light. Her relief was so profound she wept again, a muted whimper and a wetness in her eyes. She could breathe, although it pained her; she was bruised and aching and unable to move. But she could breathe. That was enough.

"Sh. Sh." A thick warm finger touched her eyelids, wiping away the moisture. "It's all right."

"Izzit?" She blinked and squinted. It was night, artificial light making warm pools in the room. Aral's face wavered over hers. "Izzit . . . tonight? Wha' happened?"

"Sh. You've been very, very sick. You had a violent hemorrhage during the placental transfer. Your heart stopped twice." He moistened his lips and went on. "The trauma, on top of the poisoning, flared into soltoxin pneumonia. You had a very bad day yesterday, but you're over the worst, off the respirator."

"How . . . long?"

"Three days."

"Ah. Baby, Aral. Diddit work? Details!"

"It went all right. Vaagen reports the transfer was successful. They lost about 30 percent of the placental function, but Henri compensated with an enriched and increased oxy-solution flow, and all seems to be well, or as well as can be expected. The baby's still alive, anyway. Vaagen has started his first calcium-treatment experiment, and promises us a baseline report soon." He caressed her forehead. "Vaagen has priority-access to any equipment, supplies, or

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techs he cares to requisition, including outside consultants. He has an advising civilian pediatrician, plus Henri. Vaagen himself knows more about our military poisons than any man, on Barrayar or off it. We can do no more, right now. So rest, love."

"Baby—where?"

"Ah—you can see where, if you wish." He helped her lift her head, and pointed out the window. "See that second building, with the red lights on the roof? That's the biochemistry research facility. Vaagen and Henri's lab is on the third floor."

"Oh, I recognize it now. Saw it from the other side, the day we collected Elena."

"That's right." His face softened. "Good to have you back, dear Captain. Seeing you that sick . . . I haven't felt that helpless and useless since I was eleven years old."

That was the year Mad Yuri's death squad had murdered his mother and brother. "Sh," she said in turn. "No, no . . . s'all right now."

They took away all the rest of the tubes piercing her body the next morning, except for the oxygen. Days of quiet routine followed. Her recovery was less interrupted than Aral's. What seemed to be troops of men, headed by Minister Vortala, came to see him at all hours. He had a secured comconsole installed in his room, over medical protests. Koudelka joined him eight hours a day, in the makeshift office.

Koudelka seemed very quiet, as depressed as everyone else in the wake of the disaster. Though not as morbid as anyone who'd had to do with their failed Security. Even Illyan shrank when he saw her.

Aral walked her carefully up and down the corridor a couple of times a day. The vibra-scalpel had made a cleaner cut through her abdomen than, say, your average sabre-thrust, but it was no less deep. The healing scar ached less than her lungs, though. Or her heart. Her belly was not so much flat as flaccid, but definitely no longer occupied. She was alone, uninhabited, she was herself again, after five months of that strange doubled existence.

Dr. Henri came with a float chair one day, and took her on a short trip over to his laboratory, to see where the replicator was safely installed. She watched her baby moving in the vid scans, and studied the team's technical readouts and reports. Their subject's nerves, skin, and eyes tested out encouragingly, through Henri was not so sure about hearing, because of the tiny bones in the ear. Henri and Vaagen were properly-trained scientists, almost Betan in their outlook, and she blessed them silently and thanked them aloud, and returned to her room feeling enormously better.

When Captain Vaagen burst into her room the next afternoon, however, her heart sank. His face was thunderously dark, his lips tight and harsh.

"What's wrong, Captain?" she asked urgently. "That second calcium run—did it fail?"

"Too early to tell. No, your baby's the same, milady. Our trouble is with your in-law."

"Beg pardon?"

"General Count Vorkosigan came to see us this morning."

"Oh! He came to see the baby? Oh,

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good. He's so disturbed by all this new life-technology. Maybe he's finally starting to work past those emotional blocks. He embraces the new death-technologies readily enough, old Vor warrior that he is—"

"I wouldn't get too optimistic about him, if I were you, milady." He took a deep breath, taking refuge in a formality of stance, just black, not black-humored this time. "Dr. Henri had the same idea you did. We showed the General all around the lab, went over the equipment, explained our treatment theories. We were absolutely honest, as we've been with you. Maybe too honest. He wanted to know what results we were going to get. Hell, we don't know. And so we said.

"After some beating around the bush, hinting . . . well, to cut it short, the General first asked, then ordered, then tried to bribe Dr. Henri to open the stopcock. To destroy the fetus. The mutation, he calls it. We threw him the hell out. He swore he'd be back."

She was shaking, down in her belly, though she kept her face blank. "I see."

"I want that old man kept *out* of my lab, milady. And I don't care how you do it. I don't need this kind of crap coming down. Not from that high up."

"I'll see . . . wait here." She wrapped her robe around her own green pajamas more tightly, seated her oxygen tube more firmly, and walked carefully across the corridor. Aral, half-casual in uniform trousers and a shirt, sat at a small table by his window. The only sign of his continued patient-hood was the oxygen tube up his nose, treatment for his own lingering soltoxin pneumonia. He was conferring with a man while Koudelka took notes. The man was not, thank God, Piotr, but merely some ministerial secretary of Vortala's.

"Aral. I need you."

"Can it wait?"

"No."

He rose from his chair with a brief "Excuse me a moment, gentlemen," and trod across the hall in her wake. Cordelia closed the door behind them.

"Captain Vaagen, please tell Aral what you just told me."

Vaagen, looking a degree more nervous, repeated his tale. To his credit, he did not soften the details. A weight seemed to settle on Aral's shoulders as he listened, rounding and hunching them.

"Thank you, Captain. You were correct to report this. I will take care of it immediately."

"That's all?" Vaagen glanced at Cordelia in doubt.

She opened her palm to him. "You heard the man."

Vaagen shrugged, and saluted himself out.

"You don't doubt his story?" asked Cordelia.

"I've been listening to the Count my father's thoughts on this subject for a week, love."

"You argued?"

"He argued. I just listened."

Aral returned to his own room, and asked Koudelka and the secretary to wait in the corridor. Cordelia sat on his bed and watched as he punched up codes on his comconsole.

"Lord Vorkosigan here. I wish to speak simultaneously to the security chief, Imperial Military Hospital, and

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Commander Simon Illyan. Get them both on, please."

A brief wait, as each man was located. Judging from the fuzzy background in the vid, the ImpMil man was in his office somewhere in the hospital complex. They tracked Illyan down at a forensic laboratory in ImpSec HQ.

"Gentlemen." Aral's face was quite expressionless. "I wish to revoke a Security clearance." Each man attentively prepared to make notes on their respective comconsoles. "General Count Piotr Vorkosigan is to be denied access to Building Six, Biochemical Research, Imperial Military Hospital, until further notice. Notice from me personally."

Illyan hesitated. "Sir—General Vorkosigan has absolute clearance, by Imperial order. He's had it for years. I need an Imperial order to countermand it."

"That's precisely what this is, Illyan." A trace of impatience rasped in Vorkosigan's voice. "By my order, Aral Vorkosigan, Regent to His Imperial Majesty Gregor Vorbarra. Is that official enough?"

Illyan whistled softly, but his face snapped to blankness at Vorkosigan's frown. "Yes, sir. Understood. Is there anything else?"

"That's all. Just that one building."

"Sir . . ." the hospital security commander said, "What if . . . General Vorkosigan refuses to halt when ordered?"

Cordelia could just picture it, some poor young guard being mowed down flat by all that history. . . .

"If your security people are indeed so overwhelmed by one old man, they may use force up to and including stunner fire," said Aral tiredly. "Dismissed. Thank you."

The ImpMil man nodded cautiously, and disconnected.

Illyan lingered in doubt a moment. "Is that a good idea, at his age? Stunning can be bad for the heart. And he's not going to like it one bit, when we tell him there's someplace he can't go. By the way, why—?" Aral merely stared coldly at him, till he gulped, "Yes, sir," saluted, and signed off.

Aral sat back, gazing pensively at the blank space where the vid images had glowed. He glanced up at Cordelia, and his lips twisted, a grimace of irony and pain. "He is an old man," he said at last.

"The old man just tried to kill your son. What's left of your son."

"I see his view. I see his fears."

"Do you see mine, too?"

"Yes. Both."

"When push comes to shove—if he tries to go back there—"

"He is my past." He met her eyes. "You are my future. The rest of my life belongs to the future. I swear by my word as Vorkosigan."

Cordelia sighed, and rubbed her aching neck, her aching eyes.

Koudelka rattled at the door, and stuck his head surreptitiously within. "Sir? The minister's secretary wants to know—"

"In a minute, Lieutenant." Vorkosigan waved him back out.

"Let's blow out of this place," said Cordelia suddenly. "ImpMil, and ImpSec, and ImpEverything, is giving me a bad case of ImpClaustrophobia. Let's go down to Vorkosigan Surleau for a few days. You'll recover better there

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yourself, it will be harder for all your minions," she jerked her head at the corridor, "to get at you, there. Just you and me, boy." Would it work? Suppose they retired to the scene of their summer happiness, and it wasn't there anymore? Drowned in the autumn rains. . . . She could feel the desperation in herself, seeking their lost balance, some solid center.

His brows rose in approval. "Outstanding idea, dear Captain. We'll take the old man along."

"Oh, must we—oh. Yes, I see. Quite. By all means."

CHAPTER TEN

Cordelia woke slowly, stretched, and clutched the magnificent silky feather-stuffed comforter to her. The other side of the bed was empty—she touched the dented pillow—cold and empty. Aral must have tiptoed out early. She luxuriated in the sensation of finally having enough sleep, not waking to that stunned exhaustion that had clotted her mind and body for so long. This made the third night in a row she'd slept well, warmed by her husband's body, both of them gladly rid of the irritating oxygen-fittings on their faces.

Their corner room, on the second floor of the old stone converted barracks, was cool this morning, and very quiet. The front window opened onto the bright green lawn, descending into mist that hid the lake and the village and hills of the farther shore. The damp morning felt comfortable, felt right, proper contrast to the feather comforter. When she sat up, the new pink scar on her abdomen only twinged.

Droushnakovi poked her head around the doorframe. "Milady?" she called softly, then saw Cordelia sitting up, bare feet hung out over the edge of the bed. Cordelia swung her feet back and forth, experimentally, encouraging circulation. "Oh, good, you're awake." Drou shouldered her way through the door, bearing a large and promising tray. She wore one of her more comfortable dresses, with a wide swinging skirt, and a warm padded vest and embroidery. Her footsteps sounded on the wide wooden floorboards, then were muffled on the handwoven rug as she crossed the room.

"I'm hungry," said Cordelia in wonder, as the aromas from the tray tickled her nose. "I think that's the first time in three weeks." Three weeks, since that night of horrors at Vorkosigan House.

Drou smiled, and set the tray down at the table by the front window. Cordelia found robe and slippers, and made for the coffee pot. Drou hovered, seeming ready to catch her if she fell over, but Cordelia did not feel nearly so shaky today. She seated herself and reached for steaming groats and butter, and a pitcher of hot syrup the Barrayarans made from boiled-down tree sap. Wonderful food.

"Have you eaten, Drou? Want some coffee? What time is it?"

The bodyguard shook her blonde head. "I'm fine, milday. It's about elevenses."

Droushnakovi had been part of the assumed background, for the past several days here at Vorkosigan Surleau. Cordelia found herself really looking at the girl for almost the first time since she'd left ImpMil. Drou was attentive

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and alert as ever, but with an underlying tension, that same bad-guard-slink—perhaps it was only because she was feeling better herself, but Cordelia selfishly wanted the people around her to be feeling better too, if only not to drag her back down.

"I'm feeling so much less thick, today. I talked to Captain Vaagen yesterday, on the vid. He thinks he's seen the first signs of molecular re-calcification in little Piotr Miles. Very encouraging, if you know how to interpret Vaagen. He doesn't offer false hopes, but what little he does say, you can rely on."

Drou glanced up from her lap, fixing a responding smile on her downcast features. She shook her head. "Uterine replicators seem so strange to me. So alien."

"Not so strange as what evolution laid on us, ad lib empirical," Cordelia grinned back. "Thank God for technology and rational design. I know whereof I speak, now."

"Milady . . . how did you first know you were pregnant? Did you miss a monthly?"

"A menstrual period? No, actually." She thought back to last summer. This very room, that unmade bed in fact. She and Aral could begin sharing intimacies there again soon, though with some loss of piquancy without reproduction as a goal. "Aral and I thought we were all settled here, last summer. He was retired, I was retired . . . no impediments. I was on the verge of being old for the organic method, which seemed the only one available here on Barrayar; more to the point, he wanted to start soon. So a few weeks after we were married, I went and had my contraceptive implant removed. Made me feel very wicked, at home I couldn't have had it taken out without buying a license."

"Really?" Drou listened with open-mouthed fascination.

"Yes, it's a Betan legal requirement. You have to qualify for a parent's license first. I've had my implant since I was fourteen. I had a menstrual period once then, I remember. We turn them off till they're needed. I got my implant, and my hymen cut, and my ears pierced, and had my coming-out party . . ."

"You didn't . . . start doing sex when you were fourteen, did you?" Droushnakvi's voice was hushed.

"I could have. But it takes two, y'know. I didn't find a real lover till later." Cordelia was ashamed to admit how much later. She'd been so socially inept, back then. . . . *And you haven't changed much,* she admitted wryly to herself.

"I didn't think it would happen so fast," Cordelia went on. "I thought we'd be in for several months of earnest and delightful experiment. But we caught the baby first try. So I still haven't had a menstrual period, here on Barrayar."

"First try," echoed Drou. Her lip curled in introspective dismay. "How did you know you'd . . . caught? The nausea?"

"Fatigue, before nausea. But it was the little blue dots . . ." her voice faltered, as she studied the girl's twisted-up features. "Drou, are all these questions academic, or do you have some more personal interest in the answers?"

Her face almost crumpled. "Per-

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sonal," she choked out.

"Oh." Cordelia sat back. "D'you . . . want to talk about it?"

"No . . . I don't know . . ."

"I presume that means yes," Cordelia sighed. Ah, yes. Just like playing Mama Captain to sixty Betan scientists back on Survey, though queries about pregnancy were perhaps the one interpersonal trouble they'd never laid in her lap. But given the Really Dumb Stuff that rational and select group had sprung on her from time to time, the feral Barrayaran version ought to be just . . . "You know I'll be glad to help you any way I can."

"It was the night of the soltoxin attack," she sniffled. "I couldn't sleep. I went down the refectory kitchen to get something to eat. On the way back upstairs I noticed a light on in the library. Lieutenant Koudelka was in there. He couldn't sleep either."

Kou, eh? Oh, good, good. This might be all right after all. Cordelia smiled in genuine encouragement. "Yes?"

"We . . . I . . . he . . . kissed me."

"I trust you kissed him back?"

"You sound like you *approve*."

"I do. You are two of my favorite people, you and Kou. If only you'd get your heads straight . . . but go on, there has to be more." Unless Drou was more ignorant than Cordelia believed possible.

"We . . . we . . . we . . ."

"Screwed?" Cordelia suggested hopefully.

"Yes, milady." Drou turned scarlet, and swallowed. "Kou seemed so happy . . . for a few minutes. I was so happy for him, so excited, I didn't care how much it hurt."

Ah, yes, the barbaric Barrayaran custom of introducing their women to sex with the pain of unanesthesized defloration. Though considering how much pain their reproductive methods later entailed, perhaps it constituted fair warning. But Kou, in the glimpses she'd had of him, hadn't seemed as happy as a new lover ought to be either. What were these two doing to each other? "Go on."

"I thought I saw a movement in the back garden, out the door from the library. Then came the crash upstairs—oh, milady! I'm so sorry! If I'd been guarding you, instead of doing *that*—"

"Whoa, girl! You were off duty. If you hadn't been doing *that*, you'd have been in bed asleep. No way is the soltoxin attack your fault, yours or Kou's. In fact, if you hadn't been up and, and more-or-less dressed, the would-be assassin might have gotten away." *And we wouldn't be anticipating yet another public beheading, or whatever, God help us.* One part of Cordelia wished they'd gone for seconds, and never looked out the damned window. But Droushnakovi had enough consequences to deal with right now without those mortal complications.

"But if only—"

"*If onlys* have been thick in the air around here, these last weeks. I think it's time to replace them with some *Now-we-go-ons*, frankly." Cordelia's mind caught up with herself at last. Drou was Barrayaran; Drou therefore didn't have a contraceptive implant. It didn't sound like that idiot Kou had offered an alternative, either. Drou had

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therefore spent the last three weeks wondering. . . . "Would you like to try one of my little blue dots? I have lots left."

"Blue dots?"

"Yes, I started to tell you. I have a packet of these little diagnostic strips. Bought them in Vorbarr Sultana last summer at an import shop. You pee on one, and if the dot turns blue, you're in. I only used up three, last summer." Cordelia went to her dresser drawer, and rooted through it for the obsolete supplies. "Here." She handed one to Drou. "Go relieve yourself. And your mind."

"Do they work so soon?"

"After five days." Cordelia held up her hand. "Promise."

Staring worriedly at the little strip of paper, Droushnakovi vanished into Cordelia and Aral's bathroom, off the bedroom. She emerged in a few minutes. Her face was glum, her shoulders slumped.

What does this mean? Cordelia wondered in exasperation. "Well?"

"It stayed white."

"Then you aren't pregnant."

"Guess not."

"I can't tell if you're glad or sorry. Believe me, if you want to have a baby, you'd do much better to wait a couple of years till they get a bit more medical technology on-line around here." Though the organic method had been fascinating, for a time. . . .

"I don't want . . . I want . . . I don't know . . . Kou's hardly *spoken* to me since that night. I didn't want to be pregnant, it would destroy me, and yet I thought maybe he would, would . . . be as excited and happy about it as he was about the sex, maybe. Maybe he'd come back and—oh, things were going so well, and now they're so spoiled!" Her hands were clenched, face white, teeth gritted.

Cry, so I can breathe, girl. But Droushnakovi regained her self-control. "I'm sorry, milady. I didn't mean to spill all this stupidity on you."

Stupidity, yes, but not unilateral stupidity. Something this screwed up had to have taken a committee. "So what is the matter with Kou? I thought he was just suffering from soltoxin-guilt, like everyone else in the household." *From Aral and myself on down.*

"I don't know, milady."

"Have you tried something really radical, like asking him?"

"He *hides*, when he sees me coming."

Cordelia sighed, and turned her attention to getting dressed. Real clothes, not patient robes, today. There in the back of Aral's closet were her tan trousers from her old Survey uniform, hung up. Curiously, she tried them on. Not only did they fasten, they were loose. She *had* been sick. Rather aggressively, she left them on, and chose a long-sleeved flowered smock-top to go with them. Very comfortable. She smiled at her slim, if pale, profile in the mirror.

"Ah, dear Captain." Aral stuck his head in the bedroom door. "You're up." He glanced at Droushnakovi. "You're both here. Better still. I think I need your help, Cordelia. In fact, I'm certain of it." Aral's eyes were alight with the strangest expression. Amazement, bemusement, worry? He let himself in. He was wearing his standard gear for off-duty time at Vorkosigan

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Surleau, old uniform trousers and a civilian shirt. He was trailed by a tense and miserable Koudelka, dressed in neat black fatigues with his red lieutenant's tabs bright on the collar. He clutched his swordstick. Drou backed to the wall, and crossed her arms.

"Lieutenant Koudelka—he tells me—wishes to make a confession. He is also, I suspect, hoping for absolution," said Aral.

"I don't deserve that, sir," Koudelka muttered. "But I couldn't live with myself any more. This has to come out." He stared at the floor, meeting no one's eyes. Droushnakovi watched him breathlessly. Aral eased over and sat on the edge of the bed beside Cordelia.

"Hold on to your hat," he murmured to her out of the corner of his mouth. "This one took *me* by surprise."

"I think I may be way ahead of you."

"That wouldn't be a first." He raised his voice. "Go ahead, Lieutenant. This won't be any easier for being dragged out."

"Drou—Miss Droushnakovi—I came to turn myself in. And to apologize. No, that sounds trivial, and believe me, I don't think it trivial. You deserve more than apology, I owe you expiation. Whatever you want. But I'm sorry, so *sorry* I raped you."

Droushnakovi's mouth fell open for a full three seconds, then shut so hard Cordelia could hear her teeth snap. *"What?!"*

Koudelka flinched, but never looked up. "Sorry . . . sorry," he mumbled.

"You. Think. You. What?!" gasped Droushnakovi, horrified and outraged. "You think you could—oh!" She stood rigid now, hands clenched, breathing fast. "Kou, you oaf! You idiot! You moron! You—you—you—" her words sputtered off. Her whole body was shaking. Cordelia watched in utter fascination. Aral rubbed his lips thoughtfully.

Droushnakovi stalked over to Koudelka and kicked his swordstick out of his hand. He almost fell, with a startled "Huh?" clutching at it and missing as it clattered across the floor.

Drou slammed him expertly into the wall, and paralyzed him with a nerve thrust, her fingers jammed up into his solar plexus. His breath stopped.

"You *goon*. Do you think you could lay a hand on me without my permission? Oh! To be so, to be so; so, so—" her baffled words dissolved into a scream of outrage, right next to his ear. He spasmed.

"Please don't break my secretary, Drou, the repairs are expensive," said Aral mildly.

"Oh!" She whirled away, releasing Koudelka. He staggered and fell to his knees. Hands over her face, biting her fingers, she stomped out the door, slamming it behind her. Only then did she sob, sharp breaths retreating up the hallway. Another door slammed. Silence.

"I'm sorry, Kou," said Aral into the long lull. "But it doesn't look like your self-accusation stands up in court."

"I don't understand." Kou shook his head, crawled after his swordstick, and climbed very shakily to his feet.

"Do I gather you are both talking about what happened between you the night of the soltoxin attack?" Cordelia asked.

"Yes, milady. I was sitting up in the library. Couldn't sleep, thought I'd run

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over some figures. She came in. We sat, talked . . . suddenly I found myself . . . well . . . it was the first time I'd been functional since I was hit by the nerve disruptor. I thought it might be another year, or *forever*—I panicked, I just panicked. I . . . took her . . . right there. Never asked, never said a word. And then came the crash from upstairs, and we both ran out into the back garden, and . . . she never accused me, next day. I waited and waited."

"But if he didn't rape her, why did she get so angry just now?" asked Aral.

"But she's been mad," said Koudelka. "The looks she's given me, these last three weeks. . . ."

"The looks were fear, Kou," Cordelia advised him.

"Yes, that's what I thought."

"Because she was afraid she was *pregnant*, not because she was afraid of *you*," Cordelia clarified.

"Oh." Koudelka's voice went small.

"She's not, as it happens." (Kou echoed himself with another small "Oh.") "But she's mad at you now, and I don't blame her."

"But if she doesn't think I—what reason?"

"You don't see it?" She frowned at Aral. "You either?"

"Well. . . ."

"It's because you just insulted her, Kou. Not then, but right now, in this room. And not just in slighting her combat prowess. What you just said revealed to her, for the first time, that you were so intent on yourself that night, you never saw her at all. Bad, Kou. Very bad. You owe her a profound apology. Here she was, giving her Barrayaran all to you, and you so little appreciated what she was doing, you didn't even perceive it."

His head came up suddenly. "Gave me? Like some charity?"

"Gift of the gods, more like," murmured Aral, lost in some appreciation of his own.

"I'm not a—" Koudelka's head swiveled toward the door. "Are you saying I should run after her?"

"Crawl, actually, if I were you," recommended Aral. "Crawl fast. Slither under her door, go belly-up, let her stomp on you till she gets it out of her system. Then apologize some more. You may yet save the situation." Aral's eyes were openly alight with amusement now.

"What do you call that? Total surrender?" said Kou indignantly.

"No. I'd call it winning." His voice grew a shade cooler. "I've seen the war between men and women descend to scorched-earth heroics. Pyres of pride. You don't want to go down that road. I guarantee it."

"You're—milady! You're laughing at me! Stop!"

"Then stop making yourself ridiculous," said Cordelia sharply. "Get your head out of your ass. Think for sixty consecutive seconds about somebody besides yourself."

"Milady. Milord." His teeth were gritted now with frozen dignity. He bowed himself out, well-slapped. But he turned the wrong way in the hallway, the opposite direction to which Droushnakovi had fled, and clattered down the end stairs.

Aral shook his head helplessly, as Koudelka's footsteps faded. A splutter escaped him.

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Cordelia punched him softly on the arm. "Stop that! It's not funny to them." Their eyes met; she sniggered, then caught her breath firmly. "Good heavens, I think he *wanted* to be a rapist. Odd ambition. Has he been hanging around with Bothari too much?"

This slightly sick joke sobered them both. Aral looked thoughtful. "I think . . . Kou was flattering his self-doubts. But his remorse was sincere."

"Sincere, but a trifle smug. I think we may have coddled his self-doubts long enough. It may be time to kick his tail."

Aral's shoulders slumped wearily. "He owes her, no doubt. Yet what should I order him to do? It's worthless, if he doesn't pay freely."

Cordelia growled agreement.

It wasn't until lunch that Cordelia noticed something missing from their little world.

"Where's the Count?" she asked Aral, as they found the table set only for two by Piotr's housekeeper, in a front dining room overlooking the lake. The day had failed to warm. The earlier mist had risen only to clot into low scudding grey clouds, windy and chilly. Cordelia had added an old black fatigue jacket of Aral's over her flowered blouse.

"I thought he went to the stables. For a training session with the new dressage prospect of his," said Aral, also regarding the table uneasily. "That's what he told me he was going to do."

The housekeeper, bringing in soup, volunteered, "No, m'lord. He went off in the groundcar early, with two of his men."

"Oh. Excuse me." Aral nodded to Cordelia and rose, and exited the dining room to the back hall. One of the storerooms on the back side of the house, wedged into the slope, had been converted into a secured comm center, with a double-scrambled comconsole and a full-time ImpSec guard outside its door. Aral's footsteps echoed down the hall in that direction.

Cordelia took one bite of soup, which went down like liquid lead, set her spoon aside, and waited. She could hear Aral's voice, in the quiet house, and electronically-tinged responses in some stranger's tones, but too muffled for her to make out the words. After what seemed a small eternity, though in fact the soup was still hot, Aral returned, bleak-faced.

"Did he go up there?" Cordelia asked. "To ImpMil?"

"Yes. He's been and left. It's all right." His heavy jaw was set.

"Meaning, the baby's all right?"

"Yes. He was denied admittance, he argued awhile, he left. Nothing worse." He began glumly spooning soup.

The Count returned a few hours later. Cordelia heard the fine whine of his groundcar pass up the drive and around the north end of the house, pause, a canopy open and close, and the car continue on to the garages, sited over the crest of the hill near the stables. She was sitting with Aral in the front room with the new big windows. He had been engrossed in some government report on his handviewer, but at the sound of the closing canopy put it on "pause" and waited with her, listening, as hard footsteps passed rapidly around the house and up the front steps. Aral's

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mouth was taut with unpleased anticipation, his eyes grim. Cordelia shrank back in her chair, and steeled her nerves.

Count Piotr swung into their room, and stood, feet planted. He was formally dressed in his old uniform with his general's rank insignia. "There you are." The liveried man trailing him took one uneasy glance at Aral and Cordelia, and evaporated without waiting to be dismissed. Count Piotr didn't even notice him go.

Piotr focused on Aral first. "You. You dared to shame me in public. Entrap me."

"You shamed yourself, I fear, sir. If you had not gone down that path, you would not have found that trap."

Piotr's tight jaw worked this one over, the lines in his face grooved deep. Anger; embarrassment struggling with self-righteousness. Embarrassed as only one in the wrong can be. *He doubts himself,* Cordelia realized. A thread of hope. *Let us not lose that thread, it may be our only way out of this labyrinth.*

The self-righteousness took ascendance. "I shouldn't have to be doing this," snarled Piotr. "It's women's work. Guarding our genome."

"Was women's work, in the Time of Isolation," said Aral in level tones. "When the only answer to mutation was infanticide. Now there are other answers."

"How *strange* women must have felt about their pregnancies, never knowing if there was life or death at the end of them," Cordelia mused. One sip from that cup was all she desired for a lifetime, and yet Barrayaran women had drained it to the dregs over and over. . . . The wonder was not that their descendants' culture was chaotic, but that it wasn't more completely insane.

"You fail all of us when you fail to control her," said Piotr. "How do you imagine you can run a planet when you cannot run your own household?"

One corner of Aral's mouth twisted up slightly. "Indeed, she is difficult to control. She escaped me twice. Her voluntarily return still astounds me."

"Awake to your duties! To me as your Count if not as your father. You are liege-sworn to me. Do you choose to obey this off-worlder woman before me?"

"Yes." Aral looked him straight in the eye. His voice fell to a whisper. "That is the proper order of things." Piotr flinched. Aral added dryly, "Attempting to switch the issue from infanticide to obedience will not help you, sir. You taught me specious-rhetoric-chopping yourself."

"In the old days, you could have been beheaded for less insolence."

"Yes, the present set-up is a little peculiar. As a count's heir, my hands are between yours, but as your regent, your hands are between mine. Oath-stalemate. In the old days we could have broken the deadlock with a nice little war." He grinned back, or at least bared his teeth. Cordelia's mind gyrated. *One day only: The Irresistible Force Meets The Immovable Object. Tickets, five marks.*

The door to the hallway swung open, and Lieutenant Koudelka peered nervously within. "Sir? Sorry to interrupt. I'm having trouble with the comconsole. It's down again."

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"What sort of trouble, Lieutenant?" Vorkosigan asked, wrenching his attention round with an effort. "The intermittancy?"

"It's just not working."

"It was fine a few hours ago. Check the power supply."

"Did that, sir."

"Call a tech."

"I can't, without the comconsole."

"Ah, yes. Get the guard commander to open it up for you, then, see if the trouble is anything obvious. Then send for a tech on his clear-link."

"Yes, sir." Koudelka backed out, after a wary glance at the three tense people still frozen in their places waiting for him to withdraw.

The Count wouldn't quit. "I swear, I will disown it. That thing in the can at ImpMil. Utterly disinherit it."

"Not an operative threat, sir. You can only directly disown me. By an Imperial order. Which you would have to humbly petition, ah . . . *me*, for." His edged smile gleamed. "I would, of course, grant it to you."

The muscles in Piotr's jaw jumped. Not the irresistible force and the immovable object after all, but the irresistible force and some fluid sea; Piotr's blows kept failing to land, splashing past helplessly. Mental judo. He was off-balance, and flailed for his center, striking out wildly now. "Think of Barrayar. Think of the example you're setting."

"Oh," breathed Aral, "that I have." He paused. "We have never led from the rear, you or I. Where a Vorkosigan goes, maybe others might not find it so impossible to follow. A little personal . . . social engineering."

"Maybe for galactics. But our society can't afford this luxury. We barely hold our own as it is. We cannot carry the deadweight of millions of dysfunctional!"

"Millions?" Aral raised a brow. "Now you extrapolate from one to infinity. A weak argument, sir, unworthy of you."

"And surely," said Cordelia quietly, "how much is bearable each individual, carrying his or her own burden, must decide."

Piotr swung on her. "Yes, and who is paying for all this, eh? The Imperium. Vaagen's laboratory is budgeted under military research. All Barrayar is paying for prolonging the life of your monster."

Discomfited, Cordelia replied, "Perhaps it will prove a better investment than you think."

Piotr snorted, his head lowered mulishly, hunched between his skinny shoulders. He stared through Cordelia at Aral. "You are determined to lay this thing on me. On my house. I cannot persuade you otherwise, I cannot order you. Very well. You're so set on change, here's a change for you. I don't want my name on that thing. I can deny you that, if nothing else."

Aral's lips were pinched, nostrils flaring. But he never moved in his seat. The viewer glowed on, forgotten in his still hands. He held his hands quiet and totally controlled, not permitting them to clench. "Very well, sir."

"Call him Miles Naismith Vorkosigan, then," said Cordelia, feigning calm over a sick and trembling belly. "My father will not begrudge it."

"Your father is dead," snapped

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Piotr.

Smeared to bright plasma in a shuttle accident more than a decade ago. She sometimes fancied, when she closed her eyes, that she could still sense his death imprinted on her retina in magenta and teal. "Not wholly. Not while I live, and remember."

Piotr looked like she'd just hit him in his Barrayaran stomach. Barrayaran ceremonies for the dead approached ancestor-worship, as if remembrance could keep the souls alive. Did his own mortality run chill in his veins today? He had gone too far, and knew it, but could not back down. "Nothing, nothing wakes you up! Try this, then." He straddled the floor, boots planted, and glared at Aral. "Get out of my house. Both houses, Vorkosigan House too. Take your woman and remove yourself. Today!"

Aral's eyes flicked only once around his childhood home. He set the viewer carefully aside, and stood. "Very well, sir."

Piotr's anger was anguished. "You'd throw away your home for this?!"

"My home is not a place. It is a person, sir," Aral said gravely. Then added reluctantly, "People."

Meaning Piotr, as well as Cordelia. She sat bent over, aching with the tension. Was the old man stone? Even now Aral offered him gestures of courtesy that nearly stopped her heart.

"You will return your rents and revenues to the District purse," said Piotr desperately.

"As you wish, sir." Aral headed for the door.

Piotr's voice went smaller. "Where will you live?"

"Illyan has been urging me for some time to move to the Imperial Residence, for security reasons. Evon Vorhalas has persuaded me Illyan is right."

Cordelia had risen when Aral did. She went now to the window, and stared out over the moody grey, green, and brown landscape. Whitecaps foamed on the pewter water of the lake. The Barrayaran winter was going to be so cold. . . .

"So, you set yourself up with Imperial airs after all, eh?" jibed Piotr. "Is that what this is, hubris?"

Aral grimaced in profound irritation. "On the contrary, sir. If I'm to have no income but my admiral's half-pay, I cannot afford to pass up rent-free quarters."

A movement in the scudding clouds caught Cordelia's eye. She squinted uneasily. "What's wrong with that lightflyer?" she murmured, half to herself.

The speck grew, jinking oddly. It trailed smoke. It stuttered over the lake, straight at them. "God, I wonder if it's full of bombs?"

"What?" said Aral and Piotr together, and stepped quickly to the window with her, Aral on her right hand, Piotr on her left.

"It has ImpSec markings," said Aral.

Piotr's old eyes narrowed. "Ah?"

Cordelia mentally planned a sprint down the back hall and out the end door. There was a bit of a ditch on the other side of the drive, if they went flat in it maybe . . . but the lightflyer was slowing at the end of its trajectory. It wobbled toward a landing on the front lawn. Men in Vorkosigan livery and ImpSec

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green and black cautiously surrounded it. The flyer's damage was clearly visible now, a plasma-slagged hole, black smears of soot, warped control surfaces—it was a miracle it flew at all.

"Who—?" said Aral.

Piotr's squint sharpened as a glimpse of the pilot winked through the damaged canopy. "Ye gods, it's Negri!"

"But who's that with—come on!" Aral flung over his shoulder, running out the door. They charged in his wake, around into the front hall, bursting out the door and churning down the green slope.

The guards had to pry open the warped canopy. Negri fell into their arms. They laid him on the grass. He had a grotesque burn a meter long on the left side of his body and thigh, his green uniform melted and charred away to reveal bleeding white bubbles, cracked-open flesh. He shivered uncontrollably.

The short figure strapped into the passenger seat was Emperor Gregor. The five-year-old boy was weeping in terror, not loudly, just muffled, gulping, suppressed whimpers. Such self-control in one so young seemed sinister to Cordelia. He should be screaming. *She* felt like screaming. He wore ordinary playclothes, a soft shirt and pants in dark blue. He was missing one shoe. An ImpSec guard unhooked his seat belt and dragged him out of the flyer. He cringed from the man, and stared at Negri in utter horror and confusion. *Did you think adults were indestructible, child?* Cordelia grieved.

Kou and Drou materialized from their separate holes in the house, to goggle along with the rest of the guards. Gregor spotted Droushnakovi, and flew to her like an arrow, to wind his hands tightly in her skirt. "Droushie, help!" His crying dared to become audible, then. She wrapped her arms around him and lifted him up.

Aral knelt by the injured ImpSec chief. "Negri, what happened?"

Negri reached up and grabbed his jacket with his working right hand. "He's trying for a coup—in the capital. His troops took ImpSec. Took the comm center—why didn't you respond? HQ surrounded, infiltrated—bad fighting now at the Imperial Residence. We were on to him—about to arrest—he panicked. Struck too soon. I think he has Kareen—"

Piotr demanded, "Who has, Negri, who?"

"Vordarian."

Aral nodded grimly. "Yes . . ."

"You—take the boy," gasped Negri. "He's almost on top of us. . . ." his shivers oscillated into convulsions, his eyes rolling back whitely. His breath stuttered in resonant chokes. His brown eyes refocused in sudden intensity. "Tell Ezar—" the convulsions took him again, racking his thick body. Then they stopped. *All stop.* He was no longer breathing. ■

CONTINUED IN NEXT ISSUE

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Julian Saari

SIDE EFFECTS

There was this bar, see, on the shore of Lake Superior, part of a fishing lodge, called Timonescu's. Ion Timonescu was the owner, and he had had an interesting history. As a child he fled Hungary in 1957 for Czechoslovakia, which he had then fled eleven years later, this time without his family. No, he didn't continue the run of bad luck by going to Afghanistan.

Nowadays he kept a Hungarian flag behind the bar with a hole cut out of its center, and smiled at odd moments, for no reason at all. He had heard enough fish stories to last him his next six lifetimes.

The regulars were an interesting group, too, at least according to Timonescu. One night they had decided that Lake Superior, the largest freshwater lake in the world, was nothing without its own legendary monster, (no doubt a cousin of Nessie and Ogopogo), which they called Soupy. They spread the legend of Soupy far and wide by telling it to visiting fishermen. Some people later claimed to have seen Soupy, and a few of them hadn't even been to Timonescu's first.

I've only been there once, by mistake, while I was waiting for someone. Lifelong addictions to science fiction and Toronto Blue Jays games are enough for me. But the one time I was there, this is what I saw and heard.

There was a man at the bar talking

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to Timonescu, and he touched his nose, and it glowed green, like a firefly's posterior. I looked him over for extra heads or arms. Nothing apparent. He hadn't touched his drink yet, but talk about getting a glow on. . . .

I ran back my memory and recalled what he had just said to Timonescu: "Bioluminescence, see? A genetic engineering firm has found a way to induce bioluminescence in human beings. It's actually a symbiotic microbe that does the glowing. Pressure changes activate it." And then he had touched his nose, mumbled something, and when he removed his hand, his nose was glowing.

Timonescu didn't say anything. Perhaps it was more interesting than fish stories. But at the other end of the bar, someone who had obviously devoted much of his life to drinking emptied his glass onto the floor and swore off forever.

"You're probably wondering why someone would invent something like this," the man at the bar said. He was dressed for fishing, but it was all new. So was his equipment. He hadn't caught anything, and clearly didn't care that he hadn't. He must have flown in on a float plane, because if he had driven here and not caught anything but mosquito bites with his expensive new equipment, he would hardly have been so cheerful. Everything about him said *American, newly rich*. Californian sub-species.

Timonescu shrugged. "Not really." Timonescu's given name, Ion, was a misnomer, since he was in no way an excited guy.

"It's for the novelty market. Impress your friends. Meet girls. OK, they'll be strange girls. Never need a flashlight or nightlight again. I had the idea while I was bailing water out of the boat. So what do you, as a man of the world, think? Will it sell?"

"It's ridiculous," said Timonescu. "*Of all the things you could have invented, why invent that?*"

The man sighed and rubbed his nose. The glow faded. "Well, actually, the microbe lives in the sebaceous glands, completely harmlessly, except that it eats the excess body oils. It would have

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been a great cure for acne."

"Where were you twenty-five years ago?"

"Pre-school. But the *only* microbe I could find which would do that *and* be harmless also had this small, insignificant, absolutely minuscule side effect—it *glowed*. But, I thought that was OK until I discovered that it responded to some of the body functions measured by a *polygraph*. You know, a lie detector."

"You mean, if you tell a lie, your nose glows?"

"Exactly. Blood pressure goes up, pulse rate increases, a bunch of other things happen, and it starts to glow. Awful, isn't it? We were going to market this to teenagers, for heaven's sake, and we would have been ruined."

Timonescu looked him over. "You don't look ruined."

"Well, we did find another market for it as a lie detector. Paid well, too. But I'm not supposed to talk about that." He glanced around warily, saw me watching, and concluded I was nothing more than a harmless local eccentric. "I want to find another use for it now. I find I like the idea of having money, and I want to let people know that I did it. They'll probably kill me, but. . . ." He shrugged and finally took a sip from his drink. "Here's to crime," he said, saluting the bartender with his glass.

Timonescu smiled rather warily. "How does a person get, ah, infected with it?"

"It can survive in water for a while. Especially soapy water. Fats, you know." He sounded proud.

"Hmm. So if I get arrested, I shouldn't wash my face. If I appear in court, stay out of the washrooms. If I go to a job interview—"

"My friend, you have a fine, albeit paranoid, mind."

"Thank you."

And the man left then. I couldn't get any more details out of Timonescu, but be warned: squeeze your nose very hard. If you see a hint of a glow, you'll never be able to tell a bare-faced lie again.

You know, the local cops are starting to greet people the Eskimo way: rubbing noses. . . . ■

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the reference library

By Tom Easton

The Silicon Man, Charles Platt, Bantam, $4.50, 253 pp.
Schizogenic Man, Raymond Harris, Ace, $3.95, 230 pp.
Heavy Time, C.J. Cherryh, Warner, $?, ? pp.
Clarke County, Space, Allen Steele, Ace, $4.50, 231 pp.
The Singers of Time, Frederik Pohl and Jack Williamson, Foundation Doubleday, $21.95, 358 pp.
The Real Story, Stephen R. Donaldson, Bantam, $19.95, 210 pp.
The Ragged World, Judith Moffett, St. Martin's, $18.95, 341 pp.
A Reasonable World, Damon Knight, TOR, $17.95, 273 pp.
Anita, Keith Roberts, Owlswick Press (P. O. Box 8243, Philadelphia, PA 19101-8243), $20.25, 195 pp.
Books on Disk

Last year Hans Moravec said in *Mind Children* that within fifty years we would be able to duplicate brain—and therefore mind—in a computer. He indicated that the key would be to mimic the functions of one small cluster of neurons, destroy the neurons as soon as the mimic is indetectable, and move on to the next cluster.[1] More recent research hints that it may become possible to read out a mind less destructively, using a combination of 128-electrode (so far) EEG and magnetic resonance imaging.

Not surprisingly, the idea of transferring human minds into computers has intrigued science fiction writers. The latest is Charles Platt. His **The Silicon Man** portrays a future USA whose government has taken over virtually all private business and research, including North Industries, where a clandestine research group has for years been say-

[1] I'm sure the same thing had been said some time earlier, by Moravec and others, in journal and magazine articles. I even seem to recall that there was an *Analog* fact article . . .

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ing, "Our LifeScan project isn't getting very far very fast, but we need more money. Give." And they got.

That's quite enough to clue the Astute Reader, even without a cover blurb that plainly says LifeScan can store a human mind in a computer. LifeScan *has* to be a *lot* more successful than Rosalind French and her colleagues are letting on. And when FBI agent James Bayley, sniffing after illicit high-tech brain guns, finds a clue pointing toward North Industries, scares the researchers and their ancient, ex-flower child, ex-hacker backer, Leo Gottbaum, and disappears, said AR is not surprised to learn that he is now the first human guinea pig, his brain shredded for the sake of the process. Gottbaum soon follows him, to become the all-powerful god of the virtual reality they share. Later, some of the researchers join them. Bayley learns something about how malleable a virtual reality can be—every wish comes true; reality is what you make it, not what you make of it.

Meanwhile, Gottbaum, last of the anarchists, is doing his damnedest to fulfill his most deeply felt dreams of freedom. Bayley's wife Sharon, a journalist, is chasing the few clues Bayley left. Does Gottbaum succeed? Does he get his comeuppance? Does Bayley get a new body? Does he ever see his wife and child again?

I'll leave you to find the answers on your own while I dwell instead on how residents of "meat" reality must react to virtual reality. As Platt presents virtuality, actions have no prices. You can have anything you want, as long as the computer can create the appropriate pattern of inputs for your simulated senses.[2] This pricelessness may mean that many people will perceive virtual reality as sinful—you're *supposed* to pay—or as conducive to spineless, undisciplined lotus-eating. It may even mean that people will flock to it before they ever reproduce themselves, and the human species will die out, except in the computer (Platt actually offers a hint that this is happening as his tale ends). Yet are actions really without prices, even in virtual reality? A computer has only so much memory and processing capacity; call it "data energy" and recognize that it is a basic resource in the computer's internal world. In order to simulate scenes, sensations, characters, events, and so on, a resident must call upon more of this "data energy" resource. Here then is the root of a virtual economics, a source for crime and class, a counter for lotus-eating.

Platt's failure to do more than hint at these fundamental issues, to my mind, weakens his tale. He has an intriguing adventure, but he doesn't take it as far as he should.

A perennial complaint among SF writers is that books that appear at the end of the year have little chance to win major awards, such as the Nebula. The problem is that to get on the award ballot, your book has to draw a number of nominations before the nomination period closes. To draw many nominations, it has to be read by even more potential nominators. And the longer it's available before the nomination period closes, the more readers it will have.[3]

For most books, of course, this problem is hardly a problem. It is about as

[2] We've been taught by philosophers all the way back to David Hume that even "meat" reality can be known only through the senses.

[3] The Science Fiction Writers of America, Inc., is addressing this problem by changing the rules on Nebula eligibility so that each book can gather votes for a full year after its publication. Makes sense.

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likely that they will win an award as that it will snow in Kuwait. Yet for some books, one suspects that it is very much a problem. They are good books, books that, if only they were published in January or June, might have the time to find readers and nominations and win prizes.

You knew it all along, didn't you? Of *course* I have just such a book in mind as a case in point. It's Raymond Harris's **Schizogenic Man**, published in November 1990.

The time is long after a world-wide war; Harris mentions artworks retrieved from the ruins of Europe by archaeologists. The place is the New City, flanked by the East and West Rivers and populated by immigrants from China, Middle (Midwestern America), Mexico, and elsewhere, sharing the world with the prosperous tourists of São Paulo and the religious fanatics of Texas. The social set-up is strange, for the New City bans religion, politics, and other roots of hierarchy. Both job and dwelling are dictated by the Lottery; chance rules, and life is never boring. (If you wonder how a ditch-digger could change overnight into a banker, and vice versa, the answer seems to be electronic skills transfer.)

In this context, meet John Heron, once an anti-Texas assassin, now a resident of the New City. Sidelined from his warehouse job by an injury, he goes to a party, meets Stella Cranach, and is led to the Black Tower, seat of the New City's government and the massive artificially intelligent computer that lets it function as well as it does. There he becomes part of a strange research project supposedly probing the nature of memory. Hooked to the computer, he dreams vivid dreams of ancient times—Egypt, Cleopatra, Marc Antony, and the approach of Octavian. In the dreams, he finds Stella in the guises of handmaidens and queens, and himself as scholars and messengers; he does things that conflict with the history that we know, and when he wakes . . .

Is his world really different? Did he really change history? Or is it that he has been dreaming for weeks and months while time has moved on, friends have changed, political crises have developed, devastating war has begun once more, and the world is ending as it did for Cleopatra and for our own age. Yet he had a daughter, didn't he? Now he has a son. One friend has vanished. Another has forgotten him. Still another seems many years older than his memory. And Stella too has changed, though he continues to crave her.

Look at the title. "Schizogenesis" means reproduction by splitting, as amoebae do it. Remember the "many worlds" hypothesis of quantum physics and notions of past-life memory. Now you have a clue to what is going on in Heron's world, to the trap he is in, to the sense of desperation that drives him to claw at the walls of the world. He wants out of there! He wants to go home! But can he—how can he?—possibly retrace all the splits his dreams have led him through and find safe haven for himself and Stella in some more benign reality?

If you want to know the answer, buy the book. You'll enjoy it.

C. J. Cherryh's conception of a future in which humanity spreads out from Earth as a wave of great space stations and merchant ships, driven by an urge to escape centralizing controlling forces, has spawned a number of interesting novels—*Downbelow Station*, *Merchanter's Luck*, *Rimrunners*, the *Cyteen* trilogy, and more. Now, with

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Heavy Time, she shifts her attention to the center from which the stationers and merchanters have been fleeing.

Heavy Time is set in Sol's own asteroid belt, where miners search for minable asteroids and are ruled by an exploitative corporate Big Mama that has come to care only for the bottom line. It doesn't want competition, and it rules the independents with an iron hand, enslaving them to the classic company store, limiting their freedom to communicate and their access to information. The situation is ripe for trouble.

Enter independents Bird and Ben, who are looking for ore in the zone assigned to them by Big Mama. They have navigation charts only for that zone. But then they detect a distress signal, Big Mama gives them the go-ahead and the charts to attempt a rescue, and the trouble starts. They find a battered ship not far from a company-owned mass-driver ship that is dismembering a large asteroid and sending the pieces to the distant smelters. Aboard the ship is a single unlikely survivor, Dekker, who is clearly off his head but insists that the 'driver deliberately destroyed his ship and killed his partner. Big Mama covers up frantically. Bird and Ben and their friends attempt to cope as best they can with bureaucracy, the need for the "heavy time" of the title (months on station for exercise and centrifugal gee exposure to counteract the decalcifying effects of null-gee on their bones), the differences between Ben's self-centered greed (inculcated by company training) and Bird's Earth-born generosity,[4] and Dekker's emergence from the company hospital.

In the end, the villains are identified and get their comeuppance, but all is not wine and roses. Only the immediate problems are solved. The centrist controllers remain, though they are now more governmental and military than corporate. And we can see the stage being set for the interstellar conflicts Cherryh has shown us in her earlier novels.

As we expect from Cherryh, the pace is rapid and there are few concessions to readers who want to know what is going on. She also insists that we pay attention, for she fills in the background without lectures, in incidental bits of information that are all too easy to miss. But the effort is rewarded. *Heavy Time*, like most Cherryh novels, is well worth reading.

You get a lot more concessions from Allen Steele, whose **Clarke County, Space** is also set on a space station and involves corporate domination of space colonization and industrialization. The differences include the location of the station—really a habitat—in Earth orbit instead of the asteroid belt, and the way the story is told. Where Cherryh insists that the reader pick up the details of background and setting on the fly, Steele lays it all out in a very traditional manner. Where Cherryh encourages the reader to feel a thoroughly breathless part of the action, Steele insists on distance. He begins by introducing an elderly journalist who is working on a book about an unspecified Clarke County crisis or disaster. To him comes a youngish stranger who offers to tell the *real* story of what happened.

And we're off and running, beginning with the flight of Macy Westmoreland from Tony Salvatore, the Mafia don who keeps her as a mistress; she has stolen a satchel full of cash and, just for good measure, tossed in the seven disks she found next to the money in

[4] It's Cherryh's claim, not mine, rooted in Earth's wealth of air and water. I can understand her point.

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Tony's safe. She thinks the disks show the truth about Tony's gangland finances and relishes the thought of giving them to the FBI and IRS. One disk, however, is something else: the control codes for an asteroid-busting nuke in low-Earth orbit. Now Tony's hit man, the Golem, is after her.

Macy's destination is the Clarke County habitat, built and run by private industry. It has an active tourist industry, including gambling and sex, and it routinely rips its employees off (the company store again). Not surprisingly, when the woman co-leader of the neohippies who runs the habitat's agriculture suggests declaring independence, and when the mysterious Blind Boy Grunt tells everyone what she said, it goes over pretty well. Meanwhile, Macy and the Golem have arrived, Sheriff John Bigthorn has warned the assassin off, Macy has gone to ground, and the Church of Elvis has arrived for a revival meeting. In due time, Elvis Himself (or His avatar) picks Macy's pocket, obtains the nuke-code disk, and turns it over to one of his crazier apostles, who promptly begins to dream of regaining the Promised Land (Graceland). The Golem tries for Macy, slaughters cops, is interrupted by Bigthorn, and then must stalk the sheriff through the cornfields.

Anyone who remembers Heinlein's *The Moon Is a Harsh Mistress* will have little trouble figuring out Blind Boy Grunt's identity and how he manages to know so much. Set this debt to a past master aside, however—and even that of independence, which actually seems fairly peripheral to events—and Steele still tells a cracking good yarn on his way to the book's thunderous conclusion. Unfortunately, the framing device—the elderly journalist and his informant—seems quite unnecessary, though it does suggest a larger context that may be exploited more fully in future novels.

When I saw **The Singers of Time**, the latest of the joint efforts of Frederik Pohl and Jack Williamson, my hopes were high. After all, between them the authors have been writing SF for over a century! Alas, the tale felt like little more than a thin excuse to offer you an admittedly nifty approach to time travel.

Some centuries hence, Earth is dominated by the alien Turtles. Humans have given up research, scholarship, and invention in order to pursue the Turtles's more advanced technologies. For high-tech jobs, they insert Turtle disks into slots installed in their heads; they become experts but cannot remember whatever they "knew" while using the disk; nor can they understand what they were doing. They eat minotaurlike Taurs, aliens who apparently once threatened the Turtle hegemony, until the Turtles learned how to squash their sentience.

A few humans are not entirely satisfied with this state of affairs. Sork Quintero spends hours listening to old university lecture chips, struggling to absorb the *human* knowledge of quantum theory and big bangs and black holes (which the Turtles consider obscene and blasphemous); he also shares with his twin, Kiri, the love of Sueling Quong and wishes he didn't have to share. Francis Krake was once rescued by Turtle scouts from a World War II plane crash; now he flies a Turtle light-speed "wave-ship," which dilates time to the max. Moon Bunderan raised the Taur Thrayl from a calf; now, faced with the prospect of seeing him gelded and slaughtered, she chooses to run away with her pet and friend.

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And now the Turtles are panicking. Their home world, with their holy Mother, fount of all their kind, has disappeared. Here is something that can be understood—and perhaps undone—only with the aid of human blasphemy. Therefore, two Turtle bosses hie off into space with Krake, Moon, Thrayl, Sork, Kiri, and Sue-ling. They find the Mother's world replaced by a giant wormhole, and then they are off on a gosh-wow tour of cosmology on the largest possible scale. Eventually, of course, the humans save the Turtles and use their new-found clout to gain humanity a better deal.

You could look for a better deal yourself.

Stephen R. Donaldson is famous as the author of *The Chronicles of Thomas Covenant* and other fantasies. It is thus of some interest when he decides to try his hand at SF, particularly when the publisher bills his try as "a masterful and ambitious five-volume series," *The Gap into Conflict*.

The opening shot in the series is the relatively brief **The Real Story**. It opens in a scruffy bar on a distant space station, where pirates and other low-lifes meet and plot. Among the pirates is Angus Thermopyle, who shows up one day with the gorgeous Morn Hyland under his iron thumb. Another pirate is Nick Succorso, who takes one glance at Morn and is smitten. Before long there is an alert; a supply ship is in trouble en route to the station. Station authorities command all ships to sit tight, but Angus and Nick sneak out just before the curfew goes into effect. And just a little later, Angus is arrested for looting the ship and Morn leaps into Nick's arms.

But wait! Here's the real story! Angus is foul and wicked enough, and he is indeed a cruel slavemaster to the innocent Morn (who, though she is a cop, is not as innocent as the barflies thought), but he too is smitten, smitten to the point where his behavior turns quite out-of-character nice. The supply ship is a trap. He was framed, he was!

Donaldson's tale is space opera derived from the hoariest days of yore. Yet he does display in it an almost poetic sense of irony, and his writing is quite evocative enough to carry the reader along. Sadly, he seems to think that the difference between SF and fantasy is only a matter of furniture. Set the tale in space, and never mind a certain vagueness over whether the action is interstellar or interplanetary. Call the spacedrive a "gap" drive and say a ship has none, except when it is convenient to "blink" across inconvenient gaps between here and there.

Meanwhile, the Forbidden Space beyond the reach of the cops beckons with its mysteries. Next up will be volume two, *Forbidden Knowledge*. I expect to pass.

Judith Moffett earned nominations for both the Nebula and Hugo awards with her 1989 story, "Tiny Tango." So many related stories—"Remembrance of Things Future," "Ti Whinny Moor Thoo Cums at Last," "Final *Tomte*," and "The Ragged Rock"—have also appeared recently in the magazines that it's really no wonder to find them pulled together and published as a novel, **The Ragged World**, subtitled "A Novel of the Hefn on Earth." The individual stories are each excellent, and they all take place in the same future. They also involve very different people with few apparent connections. Moffett forges and strengthens those connections in the material she has added to the published stories, and she does indeed knit the pieces into a single whole, albeit one

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rather more dependent than usual on coincidence.

The basic gimmick is simple enough: The hobgoblins of folklore are rebellious aliens set down on Earth centuries ago to repent the error of their ways. The return of the mother ship, however, was delayed until the early days of the twenty-first century. By then, a few people had met the hobs or Hefn and had their memories of the meetings suppressed. One of these people is a college student who glimpses his Hefn in a time-window; he also glimpses a future in which a Pennsylvania nuclear power plant suffers a meltdown; he becomes a politician with a private preparedness policy. Another is a walker on the English moors. Another important character is a HIV-positive woman who struggles to defend herself against AIDS by living a low-stress life—until the day of the meltdown. There are two intensely bonded children, one of whom will . . .

I shouldn't say too much there, should I? So let's get back to the Hefn and their secret masters, the Gafr. They are deeply offended by the balls-up humans have made of Earth—meltdowns, tropical deforestation, pollution, overpopulation, and so on. They therefore take charge, issuing ultimata that one might expect to provoke serious conflict; in Moffett's world, many people take more of an "It's about time someone did it!" attitude. The aliens are definitely nice guys (though they do go rather overboard in their insistence that testing an AIDS cure on animals is a no-no), and it is their presence that makes the story possible. Yet they are largely background. The story itself is one of human beings, of human agonies and loves, of human losses and triumphs.

Moffett handles her story and its characters with marvelous warmth and empathy. You, like me, will find her imagination a wondrous place to visit.

I wish that I could say that **A Reasonable World**, the third volume in Damon Knight's *CV* trilogy, was marvelous too. The first volume (*CV*) presented us with a sea-going city and the discovery of an alien from space, marooned at the bottom of the sea for eons. The alien was immaterial and able to invade the human nervous system, where it had various strange effects. It also scared the dickens out of the human characters. In the second volume (*The Observers*), the alien proved to be a symbiote that vastly improved human bullshit detectors, and Knight had a good deal of fun exploring what that might mean.

Now he reveals that the symbiotes can improve the efficiency of the human nervous system, kill killers whom the symbiotes don't think are justified (they permit the murder of a trapper because the trapper torments animals), and in general push human society toward Knight's idea of utopia. The main component of this utopia, the extermination of money as more than an antiquarian concept, provides much of what passes for plot.

A Reasonable World is interesting enough, but not as interesting as its two predecessors. The main problem is that it fails to rise above the level of a utopian tract.

Keith Roberts is a British writer of wit, intelligence, bite, and far too little productivity. Among his works, which include the classic *Pavane*, have been sixteen late-sixties short stories starring a young, modern witch, Anita, who is not all that good at doing evil for two reasons: her heart bleeds for the plights of others while other parts respond to the appeals of boys. Anita lives with her

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Gran, a curmudgeonly old biddy who speaks in the broadest of country dialects and thus gives the tales a heavy dose of ethnic humor. Add in a view of the nether realm that likens it to any hidebound Earthly bureaucracy, and you have **Anita**, a very pleasurable evening or two of reading, and a moment to wonder why these stories haven't become a TV show or movie.

BOOKS ON DISK

J. Neil Schulman, President of SoftServ Publishing, called recently to say, "I see you've started covering electronic publishing. Wanta see mine?"

"Hokay," I said. "Show me." And he did. He's got the unabridged version of Mike Banks's and Dean Lambe's *The Odysseus Solution:* He's got his own *The Rainbow Cadenza* and *The Robert Heinlein Interview and other Heinleiniana*. He's got William Dubie's *The Birdhouse Cathedral*, technological poetry. He's got Keith Kirts's *The Devil's Drainpipe* and *Space Sex or Tricks for Goldfish*. There are titles by Harlan Ellison, Robert Silverberg, Robert Anton Wilson, Victor Koman, and more, more, more! Prices run around $5 a book.

With the reprinted material (Banks/Lambe, Schulman, Ellison, Silverberg, Koman), you can trust the quality, right? For the original SoftServ titles, such as those by Kirts, I've read just enough to say that the quality is notably above much of what I've seen from other disk-top publishers. One main drawback here is that SoftServ supplies its wares in "compressed" format, meaning that once you "uncompress" the computer files, they demand more room than is on a disk. That is, you need a hard disk in your computer. Another drawback is that SoftServ does not supply a special "user interface"; that is, you have to use the DOS "TYPE" command (with the PAUSE key), BROWSE.COM, XTPRO, or your favorite word-processor to view the books. Happily, Schulman told me, he is looking at Ted Husted's IRS interface and may soon be using that. Disk-top publishing is still finding its feet.

Interested? You can write SoftServ Publishing at P. O. Box 94, Long Beach, CA 90801-0094 or call at (213) 824-5145 (10 A.M.-6 P.M., Pacific time). If you're a modem user, the phone numbers are (213) 957-1176 and 957-9874. Titles can be ordered on disk or downloaded directly to your computer. ■

●Truth is like a well-known whore. Everyone knows her, but it is embarrassing to encounter her on the street.

Wolfgang Borchert

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brass tacks

Dear Mr. Schmidt:

I started a letter in response to your October 1990 editorial, "Authority vs. Consensus," but it became bloated and turned into a whole essay. If you can use it as a guest column or editorial, or if it can be modified so, then well and good; if not, feel free to crop it if you want it in your letters column. . . .

FYI: I'm associate professor of Language, Communication, and Culture (that means English) at Georgia Tech, and I have two courses in SF. As Albert Compton Friborg, I sold a story to *F&SF* back in 1954. My book *The Connecticut Yankee in the Twentieth Century: Travel to the Past in Science Fiction* appears from Greenwood Press late 1990 (probably *really* late, like December).

I enjoyed your editorial, and applaud any attention given to change and stability in our language. Further, I continue to enjoy a magazine I have been reading since 1939. . . .

I'm sorry we couldn't accommodate your whole essay, but the part that follows seemed to me particularly pertinent and insightful. . . .

Change and variety in language, as in anything else, are mixed blessings and not to be avoided. Very few folk who are concerned with language by way of profession—linguists, writers, editors, English teachers—would want to freeze the language into a Forever Mold; and very few would be in favor of suppressing its infinite variety, so that Dauphin Island, Alabama, shrimpers would all talk like Yale doctors.

On the other hand, most such people are concerned that change brings about a language which is clear, precise, and elegant; and that means, as with most of the changes dealt with by SF, resisting some changes and encouraging others.

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I approve of *Ms.* on grounds of fairness—after all, *my* honorific wasn't changed when I married—and I agree with Professor Keith Baird that *African-American* and *Euroamerican* are to be preferred to *black* and *white*, simply because categorizing folk as to culture makes better sense than classifying them by appearance. And *fond of* no longer means *silly about*, as it did to Shakespeare and Swift, and I can see no harm in that, as long as your Shakespeare and Swift are adequately footnoted; no point fighting in *that* ditch. *Unique* may be salvageable, and we can't tell until we try hard to salvage it.

People concerned with language —teachers, writers, editors, scholars—should be listened to as we listen to economists on money, political scientists on politics, ecologists on the environment. They have thought more about the matter than the rest of us, and to that extent they deserve a hearing, but they can be as wrongheaded as the rest of us. When I plan on investing money, I read the economists, but it is I who make up my mind how to do it. Accepting or rejecting authority just *because* it's authority is foolish. The technicians *and the rest of us* ultimately decide the uses to which our technology will be put; the linguists *and the rest of us* make our language, for better or for worse.

BUD FOOTE

Atlanta, GA

Dear Mr. Schmidt:

I thought the story by Christopher Anvil in the November 1990 *Analog* was great! I always turn to his stories first thing. I have read his Paradise Planet/Interstellar Patrol Stories so many times I almost have them memorized. Let's have more by him!

I think that telepresence as discussed in John Cramer's Alternate View will have a bigger impact on our lives than the telephone, radio, TV, and computers *combined*. I heard about it first in *Analog*.

JAMES W. MILBURN

Washington, D.C.

Dear Stan:

Your November 1990 editorial "The Door on the Desktop," touched on one of my pet peeves, so I was motivated to respond.

Your editorial reveals an unstated but implicit premise, namely, that human beings are obligated to answer the phone every time it rings. Anyone wishing to regain control of their telecommunicative lives should replace this quaint notion with a more modern operating principle: *"I shall* not *answer the phone unless the caller gives me* compelling *reason to do so."*

When the phone rings during dinner, ignore it. Your answering machine will take the message, and you can return the call later—*if* you want, and at *your* convenience. Prank calls may be skipped, erased, or terminated mid-sentence with the touch of a switch. When someone hangs up without leaving a message, I assume they'll call again once the urgency of their mission exceeds their Luddite antipathy to my electronic secretary. I've never understood why some people feel they have a constitutional right to intrude at a time and place of their own choosing. Such unwanted callers are "time burglars," as unwelcome as a thief carrying my VCR out the door.

Caller ID (and ID Blocking) is a clear case of technological overkill. An answering machine works just fine. Just listen to the message as it's recorded. Pick up the phone if you like what you hear. Callers will leave their number if

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they want you to have it. Nobody's privacy is violated. There are no extra monthly charges in perpetuity to Ma Bell and the Seven Dwarves. Phone company engineers can be redeployed on fiber optics, packet switching, national data bus R&D, or any of dozens of more useful projects.

ROBERT A. FREITAS, JR.
Editor and Publisher,
Value Forecaster
Pilot Hill, CA

No, I did not assume that people are obligated to answer the phone every time it rings. I assumed only that many people would like to decide whether to answer it. You're quite right than an answering machine provides one way to do that; Caller ID (with or without blocking) provides another. You prefer one; others, for whatever reason, prefer the other. My essay was not about their relative merits, but about the controversy over whether and how Caller ID should be allowed as an option.

Dear Mr. Schmidt:

Your editorial, "The Door on the Desktop" (*Analog*, November 1990), comes close, but it leaves out a few crucial details.

You state "Some have argued that making blocking available would eliminate the reason for offering caller ID . . ." and counter this with "but nobody has to answer such a call . . ." without noting that a call may be intrusive even if not answered.

I can be harassed by an anonymous caller who never says anything. She might call at 15 minute intervals from 1:00 A.M. until 5:00 A.M. With today's relatively inexpensive PCs, she doesn't even have to stay awake while keeping me up. Someone else might call and stay on the line until answered, blocking legitimate callers. In both cases, it does me no good to know that the caller wants anonymity; what I need is enough information to file charges.

There is a simple technological solution that addresses all of the *legitimate* privacy concerns (I do not consider the concerns of the obscene caller, the kidnapper, and such, to be legitimate.) Allow each telephone subscriber to indicate whether he is willing to accept anonymous calls. A blocked call to a callee not wishing to receive it would receive a recorded announcement that the call cannot be completed anonymously. The caller would have the option of turning off his "blocking device" for the duration of the call, making the call from some other telephone, or of leaving the callee undisturbed.

Of course, there are a couple of economic and technological givens for this solution to be acceptable. Most important, the callee's line must remain free when the incoming call is rejected. Second, any costs involved in rejecting the call must be borne by the caller, and they must be commensurate with the actual costs of a reasonable implementation, e.g., if he is calling long distance, he should pay a modest forwarding fee but less than the cost of a second (local) call.

SEYMOUR J. METZ
Annandale, VA

Dear Sir,

I would like to point out to Professor Cramer, who wrote November's Alternate View, that the reply: "Of what use is a new born baby?" is often attributed to Benjamin Franklin as he watched the first Charles, or Hydrogen, balloon ascent from Paris. The answer, of course, is: "To fulfil the needs of adults," but I digress. Michael Faraday, when asked by the then Chancellor of the Exche-

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quer, Mr. Gladstone, what was the use of his primitive electromagnetic generator, is said to have repelied: "I do not know sir, but, by gum, one day you will tax it!"

DR. DAVID G. STEPHENSON
Canada

Dear Stan;

I've been reading science fiction novels and anthologies since I was in my teens. I discovered *Analog*, and other science fiction magazines, after I moved to New York City in 1970. I've been a "regular" ever since.

During most of my adult life, I've worked in the insurance and reinsurance industry. It's been a rare science fiction story (particularly a "hard science" *Analog* story that "clanks") that involved my employment experience.

During the last few years, I've become involved with catastrophe reinsurance; estimating the possible losses that may occur to a client insurance company due to natural disasters. Nowadays I'm studying hurricanes, tornados, weather and climatology. Professor T. Theodore Fujita—his tornado "Fujita Scale"—the University of Chicago, and the NOAA are part of my daily work experience.

Then bingo! A quartette of stories/articles reflecting my current areas of study:

1) "Funnel Hawk," by Tom Ligon (June 1990) was right in the realm of my "real world" work experience. I enjoyed it very much!

2) "Only the Weatherman," by Doug Larsen (September 1990). Once again, another enjoyable, weather-related story.

3) "Where Buffalo Roam," by John & Mary Gribbin (October 1990) is a quality speculation about the weather's effects on history and prehistory. Paleontologists were the first to learn that the Earth's climate has not been "steady state." Archaeologists eventually became aware of this. Now perhaps historians will take notice.

4) Then there's November 1990's "Probability Zero: The Cosmic Implications of Your Mailing Label," by Dean McLaughlin. I considered arranging a catastrophe treaty for this event (sort of the ultimate natural disaster). But I'm not convinced that the value of the pound, dollar, yen or ecu will remain stable after the "Big Crunch."

The capricious whims of the computer chip gizmos in John E. Stith's "Naught for Hire," (July 1990) were also great fun and well within my daily work experience. I'm sure Mr. Stith was personally introduced to my company's photocopier. It's one of the new ones that's so busy with its internal program, it hardly has time to make a copy.

"I'm warming up now. . . . Come back in ten minutes."

"I'm adjusting copy quality now. . . . Come back later."

It includes a whole alphabet of blinking, colored glyphs that foretell of paper jams and other calamities, but are only meaningful to an Aztec.

My congressional representative, Susan Molinari, recently sent me a flyer advising that the Staten Island dump is the second largest man-made object on this planet. Supposedly only China's Great Wall is larger. I responded by sending her a letter with a copy of your August editorial, "Bag Limit," attached.

And "Schrödinger's Lifeboat" (also August 1990) reminded me of the time I attempted to explain the implications of Schrödinger's Cat to my college philosophy instructor.

Stan, please note that prognosticator Iben Browning has used the positions of

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the Earth, Moon, and Sun to predict a major earthquake (at least 7 on the Richter Scale) at the New Madrid fault on December 3rd, 1990. It will cause the end of American civilization.

Therefore, I am taking this *immediate* opportunity (e.g., before the end of civilization in December, or the end of the Universe at any instant—1999 plus or minus 10 or 20 years) to say that I think you're doing a great job at *Analog*. And I hope you keep up the good work 'til the end of time!

WILLIAM J. KECK, III
Staten Island, NY

Dear Dr. Schmidt,

I am forming a committee to discuss and promote a multi-state lottery with the goal of funding, partially or fully, specific technological projects. Because of their nature, I have in mind certain space projects, starting with the Space Station.

There's a flaw in funding schemes for current state lotteries that has long bothered me. Although there are many deserving recipients of lottery profits, ranging from education in many states, to prison construction in Kansas, the money is generally not spent to reduce next year's need or expense. Education will always need more money, more senior citizen programs are always wanted, Kansas will always need more and/or improved prisons.

And, human nature being what it is, the "bonus funds" aspect is neutralized when the lottery revenue becomes part of the anticipated budget figure.

But a project like the Space Station is ideal for lottery spending. First, the government has established that it is desirable and worth spending money on. A big hurdle. In addition, *Analog* readers are intimately aware of the long-range benefits, tangible and intangible, that government decision-makers may have overlooked or ignored. The Space Station is, secondly, going to be finished some day. Once built, it can be signed over to NASA and funding redirected to another deserving project. That doesn't happen with current funding schemes involving the lotteries.

What legislator wouldn't like to eliminate part or all of the Space Station budget from the federal budget in these times of deficit-reduction crises, while assuring that the station gets built?

I've been fascinated by this idea ever since science writer Robert Prehoda first outlined it in a March 1983 *Omni* editorial. I also recall that Gerard K. O'Neill set up a conference with a $500 grant to discuss space habitats at L5 using current technology . . . and captured the imagination of America. Even if L5 habitats, and multi-state space lotteries, never materialize, the concept is worth discussion.

I welcome comments and support from interested readers.

NICK HOWES
711 East Webster
Benton, IL 62812 ■

●Inviting Socrates to join an argument is like inviting the cavalry to battle on an open plain.

Plato

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a calendar of analog upcoming events

26-28 July
TORONTO TREK V (Toronto area media fan convention) at Regal Constellation Hotel, Etobicoke, Ont. Guests—Walter Koenig, Michael Dorn (tentative), J.M. Dillard, Larry Stewart. Registration—C$32/US$30 until 30 June; C$37 at the door. Info: Toronto Trek V, Suite 0116, PO Box 187, 65 Front Street W., Toronto ON M5J 1E6 Canada.

2-4 August
HORRORFEST '91 (Horror oriented conference) at Bismark Hotel, Chicago, Ill. Author Guests of Honor—Joe Lansdale, Paul Dale Anderson; Editor Guests of Honor—Gretta Anderson, Crispin Burnham; Fan Guest of Honor—Richard Crowe. Info: Horrorfest 91, Box 277652, Chicago IL 60627-7652 (include SASE with 52¢ postage).

16-18 August
WINCON II (British SF conference) at King Alfred's College, Winchester, U.K. Guests of Honour—Gene Wolfe and Brian Stableford. Registration—£15 attending, £8 supporting. Info: Wincon, 38 Outram Road, Southsea, Portsmouth, Hants. PO5 1QZ, England, U.K. 44 705 754 934.

29 August-2 September
CHICON V (49th World Science Fiction Convention) at Hyatt Regency, Chicago, Ill. Guest of Honor—Hal Clement; Artist Guest of Honor—Richard Powers; Editor Guest of Honor—Martin H. Greenberg; Fan Guests of Honor—Jon & Joni Stopa. Registration—$150 at the door. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Join now and get to nominate and vote for the Hugo Awards and the John W. Campbell Award for Best New Writer. Info: Chicon V, Box 218121, Upper Arlington OH 43221-8121.

6-8 September
BARCON (SF Club Deutschland conference) at Statthaus Bockler Park, Berlin, Germany. Registration—DM30. Info: Bernhard Kempen, Kamtnerstraβe 29, 1000 Berlin 62, Germany.

8-14 September
VOLGA-CON (International SF convention on the Volga). Sponsored by SF Club "The Winds of Time" and the Youth Association ATOM. Info: Volga-con, % Boris A. Zavgorodny, Volgograd-66, Poste restante, 400066 U.S.S.R. Telephones: 34-74-62, 34-74-64, 34-44-09, 34-86-56.

August is a quiet time for conventions because the World SF Convention is held over the Labor Day Weekend. This is a good time to remind convention runners that notice must be received at least six months prior to the date of the convention. You can remove a node from the path by sending info to me directly at Post Office Box 429, Natick, Massachusetts 01760-0005.

—Anthony Lewis

Items for the Calendar should be sent to the Editorial Offices six months in advance of the event.

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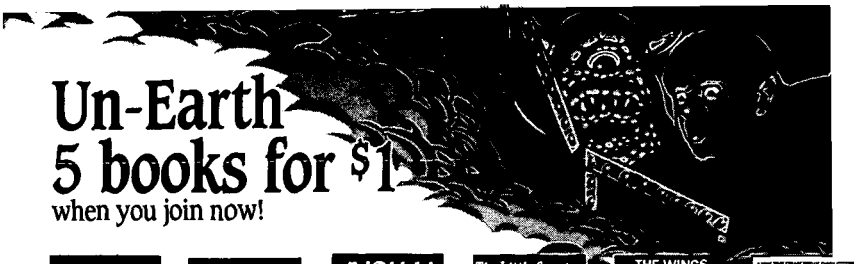

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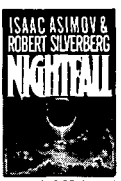

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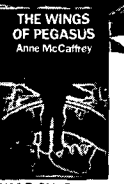

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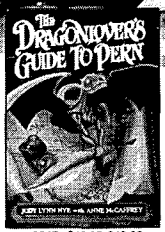

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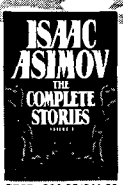

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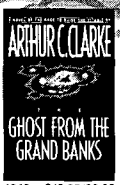

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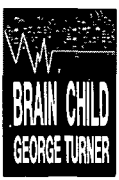

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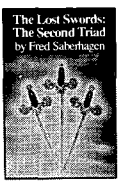

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